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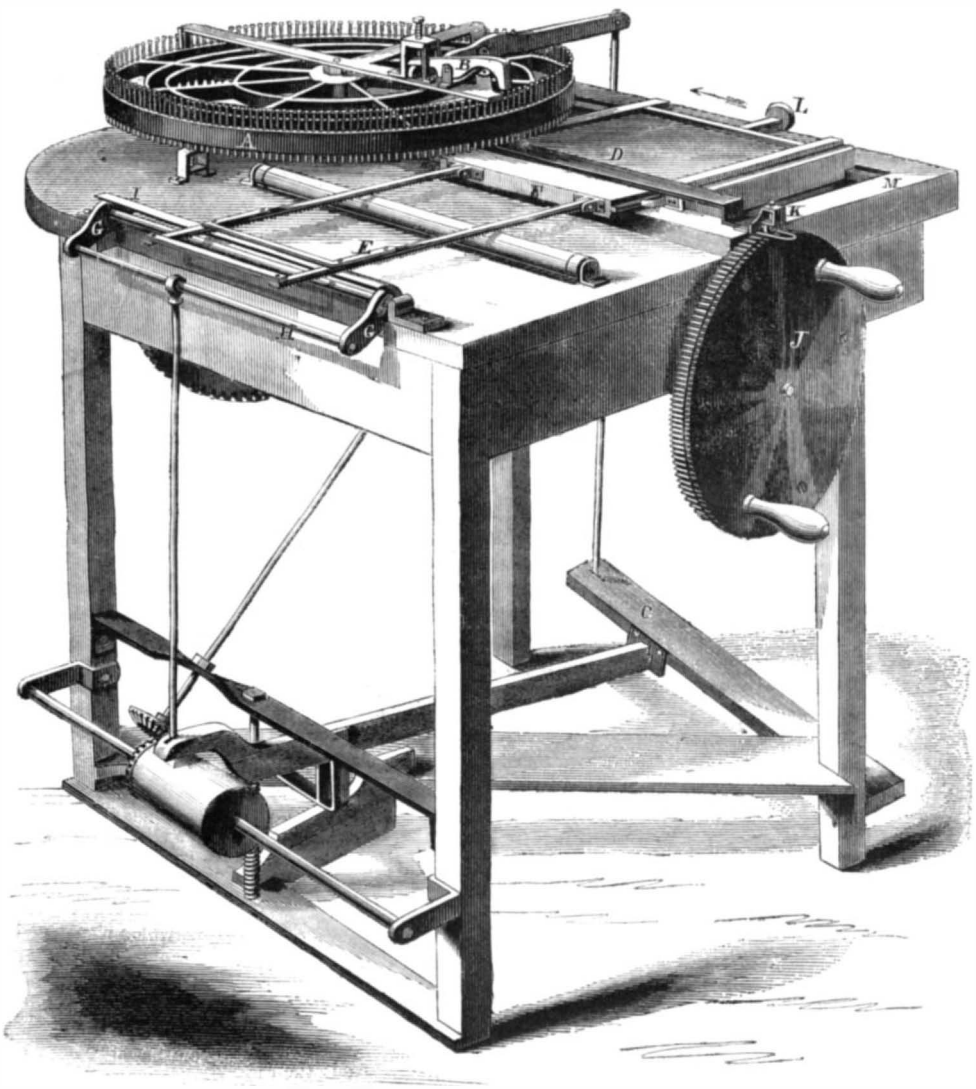
Improved Typographer.

This apparatus is intended to make electrotype molds, thus avoiding setting and distributing types, and consequently accelerating the work of the compositor. A set of 160 figures, or types, are placed round about a revolving wheel, A, which are kept up by spiral springs; these letters are depressed by means of the lever, B, when the same is acted upon by the treadle, C. On the slide-board, D, a layer of plastic substance is placed, on which the figures are impressed, and after an impression has been made, the slide-board will move forward (the distance of one type) by means of the spring, E, which moves the bar, F, which, in turn, draws the slide-board. The toothed spring, E, is brought into action by the lever, H, which is connected with the above-mentioned treddle, C, so that one pressure of the foot will produce both motions. As some figures require more room than others, their respective spaces are regulated by the arms, G, which make precisely the same number of vibrations as the type-wheel; the indented rack, wherein the tooth, I, of the lever, H, falls, allows the board, F, to move more or less forward, according to the size of type the indentations correspond with. To facilitate turning the type-wheel, a smaller wheel, J, with two handles, is placed in front of the apparatus. It is turned with both hands, and by its motion causes the type-wheel to revolve. It has on its edge representations of the figures on the type-wheel, and whenever such representations are brought to a certain mark, K, the corresponding figure or type will be under the lever, B, before-mentioned, they having been so arranged that they agree. As soon as the operator stops turning, the motion of the wheels is stopped by springs, and he has but to press his foot on the treddle to get the desired impression on the plastic layer placed on the slide board, under he type. One line being thus printed, the operator thrusts the slide-board back to its former place, and by pressing with his right hand on a knob, L, the board will move upward in the frame, M (as shown by the arrow), the distance between the lines; this is done by means of mechanism concealed under the slide-board, and not visible in the engraving. An operator, when used to work with this machine, will, according to the inventor, be able to make, at an average, fifty impressions per minute, which is a great saving of labor, as in ordinary type-setting seldom more than 8 or 9 types at an average are set in that time. On the type wheel are, as we mentioned, 160 figures; to wit, two alphabets of Roman type (small letters and capitals), and two alphabets of italics (also small letters and capitals); beside these the other figures, such as points, commas, semicolons, &c., and the cyphers, are there. The cyphers are thirty in number; namely, ten large cyphers, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, to form all the full numbers, and twenty small ones, to form the fractional numbers, placed in this way, ¹ ² ³, &c., and ₁ ₂ ₃ &c. For ordinary book printing, as for novels, &c, these 160 figures will suffice; but for printing where a great variety of types is required, it will be necessary to use more than one machine, with different kinds of types. The plastic substance, recommended as being best adapted for the use of this apparatus, is a mixture of bees-wax and gutta-percha; the wax alone being too brittle, and the gutta-percha too hard. The gutta-percha, however might be used when first made soft, by dipping it in hot water; but a mixture of an equal quantity of wax and gutta-percha is preferable. The machine can also be used for printing on paper, by placing a sheet of white paper, covered with a sheet of dark transfer paper, on the slide-board. Or, if any one should prefer to print with ink, it would be but a small additional cost to add one or two rollers to the machine intended for printing ink. The engraving is drawn from a model. Machines hereafter will be made of iron and will have a more elegant appearance.



DE MEY'S TYPOGRAPHER.

The price of the machine is $150, and it is guaranteed to work accurately when delivered. Orders are taken by Mr. Wm. F. Holske, of the firm of Holske & Kneeland, No. 100 Walker street, New York. The applicant should mention the size of types desired.

The patent was granted the 9th day of June, 1863, to F. A. De Mey. The entire patent, or State, county and town rights for sale. For further information address F. A. De Mey, at the Coleman House, 645 Broadway, New York.

Armament of the Monitors.

The ordnance officer of the monitor *Patapsco* has furnished a transcript from his record of the expenditures of shot, shell and powder by that vessel during her period of service of less than a year. The armament of the *Patapsco* is one 8-inch rifle and one 15-inch Rodman (smooth bore). The record shows that up to the 4th of last November this monitor expended, for the 8-inch rifle, 44 tons plus 640 pounds of shot, or altogether 109,200 pounds; expenditure of powder for rifle gun, 14,970 pounds; for her 15-inch gun she expended 7 tuns, plus 1,430 pounds, or 17,130 pounds of shot; expenditure of powder for 15-inch gun, 12,095 pounds. A very simple calculation from these data shows that the 8-inch rifle has fired 551 rounds (109,200 pounds of shot, divided by 200, which is the weight of each shot); while the 15-inch gun has fired but 43 times (17,130 pounds of shot, divided by 400, which is the approximate weight of the shot of the 15-inch gun); that is, more than twelve rounds have been fired from the 200-pounder rifle for every one from the 15-inch Rodman. This is a striking illustration of the comparative practical value and efficiency of these two types of guns, placed side by side in the turret of the same monitor. We believe there are at this moment but three 8-inch rifles in the armament of the total monitor fleet. And such is the incomprehensible policy governing the Ordance Bureau of the naval service, that the new monitors are being armed with the Rodman 15-inch *exclusively*, and this in face of the fact that their commanders have begged to be allowed one rifle at least. It is the universal testimony of naval men that three-fourths of the inefficiency of the monitors is owing to their defective armament.

M. About, in a recent publcation, says of an avaricious man, that "it had been proved that after having kindled his fire, he stuck a cork in the end of the bellows to save the little wind that was left in them."

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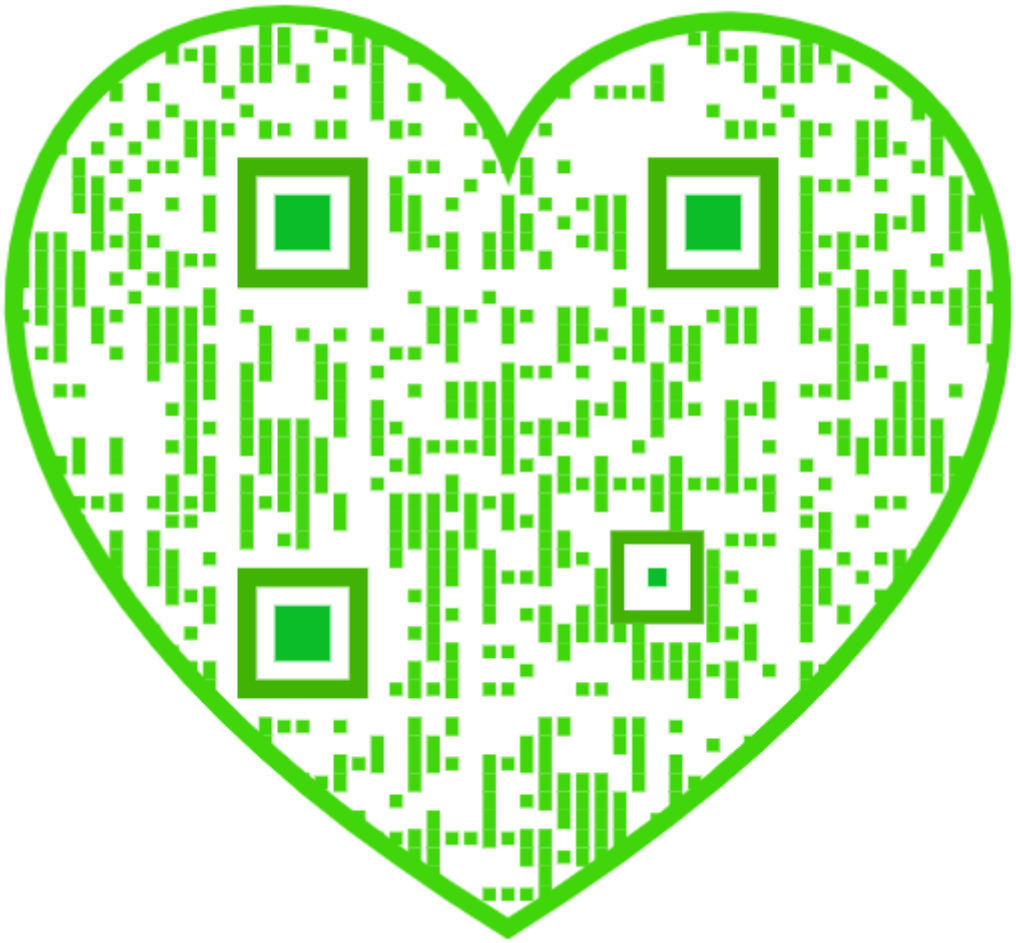

COFFEE AND THE PROLONGATION OF LIFE.

In the days of the old alchemist, a notion prevailed that some substance could be obtained in nature that would prolong human life and render man almost immortal. For many years sages and dupes searched for the "elixir of life," and when whisky was discovered, it was hailed as the grand desideratum and called *aqua vitae*; but alas it has turned out to be the water of death to far too many erring mortals. The elixir of life however is still an enamouring topic, and Louis Figuier, a French author, has lately published an article in *L'Annee Scientifique*, in which he advances the claims of coffee as a means of prolonging human life. With respect to its beneficial influences he cites facts in proof of his position.

Quoting Dr. Petit, of Chateau Thierry, on the subject, he says:

"Let us transport ourselves to the frontiers of the Department du Nord, to the coal mines of Charleroi, there where thousands of men are buried every day for twelve hours in the bowels of the earth for the purpose of extracting the enormous masses of coal required for feeding the furnaces of our factories. We there see vigorous workmen, whose exterior indicates robust health, and the greatest muscular development, and yet their food is neither substantial nor abundant; three or four cups of coffee a day and potatoes, and one pound of meat in the week, is all the nourishment supplied to the workmen in the coal pits of Charleroi. These men can live on one quarter of the food that is necessary to keep up the force of other individuals. In the neighborhood of Riesen-Berg, in Bohemia, in the midst of the Krapack mountains, there exists a race of poor people who almost all follow the trade of weavers. For years their food had been altogether insufficient, being composed solely of potatoes; they were reduced to such a state of wretchedness as to become to some extent degenerate. Fortunately the Medical men of the country conceived the idea of placing them uuder a course of coffee. The trial succeeded beyond all expectation, and the weavers of Riesen-Berg have no longer cause to envy the health and strength of the workmen of other countries. For the purpose of facilitating the acquisition of that salutary substance by the poor mountaineers, the Austrian Government has recently abolished the duties that used to be levied on the importation of coffee. Coffee says M. de Gasparin, renders the elements of our organism more stable. It is observed that, under the influence of coffee, the produce of the secretions is more fluid, the respiration less active, and, consequently, the loss undergone by the absorbed substances less rapid. A diminution of animal heat has even been observed under similar circumstances. This last consequence helps us to understand the utility of coffee in hot countries; where the temperature is so difficult to bear that it seems to wear out the springs of life. Our military and naval authorities have made coffee form a part of the rations of our soldiers and sailors on active service, and have reason to be satisfied with the result. The use of coffee has been of immense benefit to our troops, as well in the African deserts as in the Crimea, in Italy and in China; the crews of our fleets have also derived the same hygienic advantages. It is of infinite value to our soldiers in Mexico, and principally in the Sierra Caliente, at Vera Cruz, that hotbed of yellow fever. As man advances in life, the bony tissue diminishes in quantity. We know, for instance, how easily the bones of old people are fractured. This accident is consequent on the slight resistance offered by the bone, which becomes weakened by the diminution of the organs. Now, to point out the consequences of this disappearance of the bony substance in persons of advanced age. The phosphoric particles of the bones are absorbed, carried away in the circulating torrent, and the molecules, thus moved along by the blood, end by obliterating the small blood-vessels or capillary tubes. One of our learned professors of the Faculty of Medicine, M. C. Robin, promulgated the idea of dissolving the phosphal deposits by means of a chemical agent; with lactic acid, for instance, it might be possible perhaps to prevent this obstruction of the vessels, which is the frequent cause of fatal congestions in the case of old people, and thus to extend the limits of human life. M. Petit is of opinion that it is better to prevent the obstruction of the vessels than to have to combat it, when once in existence. From the well-established fact that coffee retards the movement of the decomposition of the organs, M. Petit concludes that by its habitual use the life of man might be prolonged beyond its common duration?"

He therefore recommends the use of coffee, especially to old persons, asserting that those who have reached the age of fifty years and upward may take from one to four cups per day of moderately strong infusion, according to the habit of the body of each individual. Dr. Petit, a French physician recommends it as an effective agent for rendering the produce of the secretions more aqueous, and for combating gout, gravel and calculous affections. In Eastern countries, where the consumption of coffee is very great, such complains are almost unknown.

PROFITS OF WOOLEN MILLS.—The Washington Woolen Mills at Lawrence, Mass., sold goods to the amount of nearly four millions of dollars last year, and their profits were $840,000, or about fifty per cent. on their capital. Their surplus now amounts to $850,000, and they propose to invest half of this, by adding twenty-five more sets of machinery to their mills

A Western Editor on Steam Boilers.

The local editor of the Buffalo *Commercial Advertiser*, thinks his life has been jeopardized by the act of a neighbor, in placing a steam boiler in close proximity to his sanctum; he therefore relieves his feelings in the following amusing paragraph:—

"We say—and without fear of contradiction—that when a steam boiler is placed in such location that its explosion would endanger the lives of hundreds of human beings, the person 'engineering" the same should be one qualified for the grave responsibilities of his position, and not one whose sole recommendation is found in the low price paid for his services, and who, at the best, may be nothing more nor less than a discarded 'stoker.'

"We speak feelingly—we might say with fear and trembling—on this subject. And this is how it is: A joint occupant of the premises in which we are located, has recently erected on the same floor, and even under our very nose, as it were, an infernal machine of the steam boiler persuasion. We never pass in or out that it does not stare us in the face, and give rise to most unpleasant misgivings. Rivets and plates are not infallible, and the minds of 'stokers' are sometimes unsettled. It has been demonstrated that steam-engines, when on a 'bust,' are no respecters of persons; and if this monster should take it into its head to explode some fine morning, its relative position to us is such as to convince us that a large fragment of the thickest portion of it would make its way, without material impediment, to the heart of our sanctum, carom on the subscriber and the deep-read editor—the 'heavy man' of the company—and make hash of the pair of us in the shortest possible space of time."

The first paragraph is eminently sound in its premises.

German Economy.

A late tourist in Germany describes the economy practised by the peasants as follows:—"Each German has his house, his orchard, his roadside trees so laden with fruit that did he not carefully prop them up and tie together, and in many places hold the boughs together by wooden clamps, they would be torn asunder by their own weight. He has his corn plot, his plot for mangel wurzel or hay, for potatoes, for hemp, &c. He is his own master, and therefore he and his family have the strongest motive for exertion. You see the effects of this in his industry and economy. In Germany nothing is lost. The produce of the trees and the cows is carried to market. Much fruit is dried for winter use. You see wooden trays of plums, cherries and sliced apples laying in the sun to dry. You see strings of them hanging from the windows in the sun. The cows are kept up the greater part of the year, and every green thing is collected for them. Every little nook where the grass grows, by the roadside, river and brook, is carefully cut by the sickle, and carried home, on the heads of women and children, in baskets, or tied in large cloths. Nothing of the kind is lost that can possibly be made of any use. Weeds, nettles, nay the very goose-grass which covers the waste places, is cut up and taken for the cows. You see the little children standing in the streets of the villages, and in the streams which generally run down them, busy washing these weeds before they are given to the cattle. They carefully collect the leaves of the marsh-grass, carefully cut their potato tops for them, and even, if other things fail, gather green leaves from the woodlands."

Deviations of the Compass.

The *Revue Maritime et Coloniale* publishes a letter on the deviations to which the needle is liable in consequence of the substitution of iron for wood in ships. One of the latest contrivances for diminishing this serious inconvenience is the correcting compass, which affords the means of taking the sun's position, whereby the deviations may be corrected. It has sometimes been supposed that fogs and certain other states of the atmosphere could influence the needle; but this has not been borne out by observation. Lightning alone exercises a decided influence on the needle by reversing its points, so that north becomes south, and conversely. When a vessel is nearing land, the needle is said to be affected, and certain rocks there are that exercise a decided influence on the compass, volcanic rocks especially, but this influence is not felt on board ships. But the action of the iron framing on the ship's sides is far different; nothing, not even the interposition of a thick non-magnetic body, will stop its influence; far less, as some have believed, a copper coating or thick paint. But the real danger proceeds from another source, since the ship herself, under her weight of canvas, may increase the deviation of the needle. From experiments made on board an iron-built sailing vessel, provided with iron rigging and lower yards of steel, and with two binnacle compasses on her poops, and a third placed between the mizen and mainmast, the lower part of which was all of iron, the deviations of the needle were respectively 56 deg., 24 deg. and 35 deg. Without entering into further details on this matter, the writer of the article concludes with condemning the imprudence of those who freight an iron vessel, before she has been at sea for a considerable time, in order to ascertain how her compass behaves. Moreover, a captain undertaking the command of an iron ship, should be called upon to show that he has previously been on board such a vessel on a long voyage, so that he may know how to deal with the deviations observable on board the vessel to be commanded.

How Colt got his Pistols Adopted by the British Government.

The Boston *Journal* gives an interesting account of the way the late Colonel Sam. Colt got his pistols recognized and adopted by the British government. The writer says: "One evening at a place of public entertainment, I was introduced by a brother-member of the press to Colonel Sam. Colt, who had recently established a manufactory of arms on the banks of the Thames. The revolver had received much commendation from the small fry of the press, the starving weeklies which would praise anything for the sake of an advertisement; but Colt was sagacious enough to know that one line in the *Times*, would do him more good than a column in any other paper. But how to get to the *Times* except in the advertising columns, was the difficulty. Colt was ready to pay any sum that might be demanded for a paragraph, because he felt assured that by such means his fire-arms would be under the notice of the ordnance authorities, who could not fail to give his manufacture a trial. As I happened to be well acquainted with some of the *Times* staff, and and also with two or three M. P.'s who had the ear of John Delane, the editor, I told Colt that I would make an effort to get him fairly noticed, but that I might conscientously recommend him I thought he should show me his new armory. He objected at first, on the ground that, in order to prevent some two or three of his secrets being known to other manufactories, he had systematically refused to admit any one within his workshop. But as I made this a *sine qua non* of my interference, he gave way. I was greatly pleased with the order, system and completeness which characterized his armory, and the severity of the proofs to which he subjected his fire-arms, and was turning over in my mind the best way of carrying out the colonel's views, when I received a letter from a lieutenant in the navy, then on board a man-of-war in the Mediterranean, telling me that he had learnt that the Russian sailors in the Black Sea were all supplied with revolvers, which would give them a great advantage in boarding should there be any naval conflicts in the war then pending. This was in 1854. I at once sent this letter to the *Times*, asking if it was fair to the British sailors that they should still be limited to the old horse pistol and cutlass? The letter was published. Sir Thomas Hastings, the head of the ordnance board, at once sent for Colt, and an order for four thousand pistols for the navy was given to him. This gave an impetus to the pistol trade, and Colt flourished. It is due to state that he treated my little effort in his behalf with a liberality truly American."

"KNOXVILLE WHIG."—C. S. Hubbard, of New Haven, Conn., has sent several hundred subscribers to the *Knoxville Whig and Rebel Ventilator*, and will continue to receive subscriptions by mail, at $2 per year, in advance. To increase his list more rapidly he will make liberal arrangements with postmasters and other reliable persons, as local agents, who will forward names and payments to him.—*Springfield Republican.*

A MACHINE, just put in operation at Kenosha, Wis., for the manufacture of matches, turns out at the rate of 1,000 matches per minute, 60,000 per hour, and working 20 out of the 24 hours, as is the intention, will produce 1,200,000 matches.

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MISCELLANEOUS SUMMARY.

CURRANTS.—Dried currants of commerce, as they are miscalled, are in reality a grape, and free from stones or pits; they come from the Isthmus of Corinth and several places in the Indian Archipelago. A small Spanish currant is sometimes sold in their stead. It is the island of Zante which furnishes the largest amount of these currants, and their cultivation is materially lessening, as the jealousy of the Ottomans does not allow large vessels to enter the gulf for their purchase. These currants grow on vines like grapes; the leaves are somewhat the same figure, and the grapes similar; they are gathered in August, and dried on the ground; when kegged they are trodden down closely with the feet. Zante island produces enough to load five or six large vessels; Cephalonia three or four, and other islands one.

COTTON AND LANCASHIRE PAUPERISM.—By recent news from England, it seems that pauperism has slightly increased in the manufacturing districts, but it was expected that other employment would soon be furnished to all who were capable of working out of doors upon public works, for which large appropriations had been made under an act of Parliament. About 30,000 bags of cotton per week have lately been consumed, of which there were, from America, 2,500 bags; Egypt, 4,800; Brazil, 3,000; West Indies, 1,000; and the East Indies, 19,000. The supply is not equal to the present demand.

SEA WALLS.—The French have introduced a new system of building sea walls which promises satisfactory results. They form gigantic blocks of concrete, weighing about 25 tuns each, which are deposited in the sea along the line of a breakwater, to afford protection to their sea walls. A new mole at Algiers consists of a base of rubble 17 feet in hight and 156 feet in width, and the concrete blocks are deposited in the sea until they rise to a hight of 33 feet above the rubble, making a total hight of 50 feet. A new harbor has been enclosed at Marseilles, surmounted by a sea wall and protected by such concrete blocks.

THE "GREAT EASTERN."—The steamship *Great Eastern* has changed owners, and is advertised to sail from Liverpool on Jan. 14, 1864. The career of this vessel heretofore has been one of financial misfortune. Perhaps a change of owners may lead to superior management and success. As a work of engineering skill the *Great Eastern* has been a success. She was buffetted by a terrific tempest for a long time, without a rudder; she struck upon a sunken rock at Montauk Point, and had thirty-six feet of her plates ripped off, and yet no symptoms of weakness were exhibited in any part of her hull.

THE apple trade of Western New York was very extensive for the year 1863—a paper of Lyons says:—"The price paid for fall fruit is about one dollar per barrel, the purchaser furnishing the barrel. Winter fruit will bring a higher price, probably. It is believed that more barrels of apples will be shipped from Wayne county this year than ever before, although the crop is considerably smaller than that of last year. West of the Genesee River, however, the yield was astonishingly large, and Monroe, Orleans and Niagara counties sent out thousands upon thousands of barrels of fruit."

NARROW-GAGE LOCOMOTIVES.—The short line of railroad between Festinoig and Port Madoc, England, is but a two-feet gage, upon which there are locomotives running daily, each drawing a load of 50 tuns, at a speed of 12 miles per hour, up grades of 1 foot in 70. Previous to the employment of these narrow-gage engines, this railroad, connected with a mine, was worked by horses.

GREAT BREAKWATER.—The greatest artificial harbor in the world is that of Cherbourg, in France. It was a roadstead open to the sweep of the ocean swells until 1783, when De Cessart, an engineer, proposed and commenced the construction of its famous breakwater. This consists of a sea wall 12,700 feet in length, which also stands 15 feet above the highest tides.

IT has been calculated that twenty cents worth of coal applied to the steam engine will raise 56,000,000 pounds one foot high; the same coal applied to horse-power only 3,600,000 pounds; to electro-magnetism 900,000 pounds, and to manual power only 600,000 pounds.

AMONG the curiosities on exhibition at the Sanitary Fair in Boston are numerous relics of Washington—his sash, saddle, epaulettes, cane, with numerous autographs and letters; bronze jar, from Shanghae, two thousand years old; sword of Miles Standish; lock of the gun which killed King Philip, of Mount Hope, in 1676, and a wooden bowl, taken from Philip's wigwam; a Bible printed in Venice in 1478, before printing was introduced into England, and numerous rare and genuine autographs and letters. There are also exhibited the shoes worn by the royal family of England, and a pair of shoes purchased in Georgia by a young lady, who arrived in Boston last Sunday. The shoes are coarser than any young lady would wear here, and are laced with white cord. Yet the lady paid forty dollars for them, and refused to sell them for fifty.

THE stock of coffee in the chief ports of Europe, on November 1, was 55,900 tuns against 49,750 tuns in 1862, and 38,100 tuns in 1861. The crop of Ceylon, year ending September 30, 1863, yielded 39,170 tuns against 29,256 tuns in 1862, 29,700 tuns in 1861, 31,552 tuns in 1860, 29,228 tuns in 1859; or average, 31,781 tuns for the last five years.

MR. J. F. TAPLEY, of Springfield, has just received a patent for a bronzing machine, or a press for printing in bronze. It has received a thorough trial of several months, effects a great saving of time and material, and works equally well in letter-press and lithographic printing.

THE first wire suspension bridge has been erected in British Columbia, over the Fraser river near Chapman's Bar. It has a clear span of 268 feet. The designer and constructor of this bridge was A. S. Healside of San Francisco, Cal. The cost was $30,000.

THE last novelty in the flower world is bouquets made of mother-of-pearl, that sparkle like jewels. The pearly part of the shell is separated in strips as thin as paper, and with these layers trembling oat and wheat ears are especially well imitated.

TWENTY years ago, the *Auckland Times* (New Zealand) was printed with a mangle. The *Albertland Gazette* has not even that convenience. One man edits, sets up, and prints that sheet, and says he hopes some day to make it pay.

WHITE porcelain reflectors have been placed on the street lamps in Paris—an excellent plan, worthy of adoption in this country; for by it the light which passes upward and is lost in space would be then thrown down upon the street.

THE most extensive coal field in the world commences near Carrollton, Kentucky, and runs north through Indiana, Illinois and Iowa, containing about 80,000 square miles, of which a tenth part, or 8,000 miles, is in Indiana.

Now that one of our countrymen has discovered a method of signalizing by sunlight, the English are proving by the usual quantity of testimony that *they* were the first discoverers.

THREE years ago not a pound of salt was made in Saginaw Valley, Mich. There has been exported from the valley during 1863 not less than 3,000,000 barrels.

THE shipments of iron ore from Lake Superior during the season of 1863 were 83, 965 tuns, which have been divided between Detroit, Cleveland, Erie and Buffalo.

THE consumption of port wine in England has decreased since 1831 fully one-eighth, and it is fast getting into the rank of a *liqueur*.

THE gross proceeds received from his works during his life by Washington Irving, were $205,383; since his decease, $34,237.

COAL AND STEAM POWER.—In a paper read before the British Association on the Coal and Coke Trade of the North of England, Mr. Nicholas Wood said it had been calculated that an acre of coal four feet in thickness produced as much carbon as 115 acres of full-grown forest, and that a bushel (84 pounds) of coal consumed carefully, was capable of raising 70,000,000 pounds one foot high, and that the combustion of 21 pounds of coal gave out sufficient power to raise a man to the summit of Mont Blanc. The aggregate steam power of Great Britain he sets down at 83,635,214 horse-power, or equal to 400,000,000 of men.

Renewing Worn-Out Files.

The London *Builder* states that Messrs. Kiesling of Liverpool renew worn-out files as follows:—"The files to be treated are first placed in a bath containing some alkali, such as soda. This removes the grease, and after washing them in warm water they are placed in a bath of dilute nitric acid and agitated. On removal from this bath they are again washed in water, then placed in the acid bath again, which is renewed by adding some fresh nitric acid and some sulphuric acid. In this the files are allowed to remain until they are sufficiently acted upon—rendered sharp—when they are washed in hot water, dried and oiled for use. The difference between this and a well-known method of treating old files, consists in the use of nitric instead of dilute sulphuric acid exclusively. Files thus treated do not last so long afterward as freshly-cut files.

THE "false-hair merchants" of London import annually at present no less than five tuns of maiden locks!

A thousand dollars an inch is the selling price of one of the California silver mines.

LABOR is the parent of all the lasting wonders of the world, whether in verse or stone.

NEW YORK MARKETS.

FOR THE FIRST WEEK OF JANUARY, 1864.

Ashes—Pot, pearl, $8 50 to $9 75 per 100 lb.
Beeswax—50c. per lb.
Bread—Pilot, crackers, 4¾c. to 8c. per lb.
Candles—Admantine, sperm, 20c. to 35c. per lb.
Cement—Rosendale, $1 50 per barrel.
Coffee—Java, 41c. per lb.; Rio, 33c.; St. Domingo, 22¼c.
Copper—American ingot, 39c. per lb.; bolts, 46c.; Sheathing, 46c.
Cordage—Manilla, 17¼c. per lb.; Russia—tarred, 21c.; American, 16c.
Cotton.—Ordinary, 73c. per lb.; Middling, 81c.; Fair, 85c.
Domestic Goods.—,Sheetings, brown standard, 39½c. per yard; Sheetings, brown, seconds, 38c. to 38½c.; Shirtings, brown, 7-8, standard, 33c; Sheetings and Shirtings, bleached—Wamsutta and New York Mills 42c. to 42½c.; Lonsdale, White Rock, &c., 33½c. to 35c.; other makers 19c. to 32c.; Drills, brown, Amoskeag, 40c. to 41c.; Drills, other, 38c. to 39c.; Ticks, York 60c. to 65c.; Ticks, Amoskeag 42½c. to 65c.; Ticks, other 25c. to 45c.; Prints, Merrimack 22c.; Prints, Sprague's 21c. to 22c.; Prints, Dunnell's 20c. to 21c.; Prints, other 12c. to 20c.; Ginghams, Clinton 28c.; Ginghams, other 21c. to 27c.; Cottonades, York 40c. to 60c.; Cottonades, York Mills 45c.; Cottonades, other 50c. to 60c.; Cotton Jeans, Laconia, &c., brown and bleached 38c.; Cotton Jeans, other 23½c. to 25c.; Cotton checks, 18½c. to 32½c.; Cambrics, 21c. to 26c.; Cotton Flannels, brown and bleached 30c. to 46c.; Cloth, all wool $1 50 to $2 50; Cassimeres, $1 25 to $2 50; Satinets, 80c. to $1; Flannels, 47½c. to 70c.; Broad Cloth, $4 to $8.
Dyewoods, Duty Free.—Fustic, $27 to $32 per tun; Logwood, $22 to $33; Lima Wood, $75 to $85; Sapan, $70 to $75.
Feathers—64c. per lb.
Furs.—Otter, $4 to $7 skins; Fox, grey silver, $5 to $10; Bear, $10 to $20; Lynx, $2 50 to $3; Marten, $5 to $10; Muskrat, 18c. to 20c.;
Flax—18c. to 22c. per lb.
Flour and Meal—$6 20 to $9 25 per barrel; Rye Meal, $5 50 to $6 65.; Corn Meal, $6.
Grain.—Wheat, $1 44 to $1 82 per bushel; Rye, $1 30; Barley, $1 35 to $1 55; Oats, 86c. to 94c.; Corn, $1 25 to $1 33; Peas, $1 12; Beans, $2 65 to $2 90.
Hay—$1 35 per 100 lb.
Hemp.—American (dressed), $275 to $300 per tun; Russian, $425; Jute, $220.
Hides.—City Slaughter, $11c. to 12c.; other varieties range from 14c. to 34c.
Honey.—87c. to 90c. per gallon.
Hops.—20c. to 32c. per lb.
India Rubber.—42c. to 82c. per lb.
Indigo.—Bengal, $1 60 to $2 25 per lb.; others, 90c. to $1 20.
Iron.—Scotch pig, $43 to $45 per tun; American, $43 to $43 50; Bar—Swedes, $150; English, $105; Sheet—Russia, 21c.; English, 6c. to 8c
Lead.—American, $10 75 per 100 lbs.; English, $10 50; Pipe, 13½c.
Leather.—Oak-tanned, 40c. to 47c. per lb.; Hemlock, 19c. to 33c.
Lime.—$1 35 to $1 60 per barrel.
Lumber.—Spruce, $20 to $22 50 per 1,000 feet; White Oak, $35 to $40; White Oak Staves, $40 to $180; Mahogany crotches, $1 to $1 50 per foot; Rosewood, 4c. to 15c. per lb.
Molasses.—41c. to 70c. per gallon.
Nails.—Cut, $5 25 per 100 lb.; Wrought, 31c. to 35c. per lb.
Oils.—Linseed, $1 90 to $2 per gallon; Sperm, $1 60 to $1 90; Petroleum, 31c. to 52c.
Provisions.—Beef, $5 to $30 per barrel; Pork, $14 to $23; Butter, 27c. to 33c. per lb.; Cheese, 12c. to 16c.
Rice.—$6 50 to $8 per 100 lb.
Salt.—Turks Island, 48c. per bushel; Liverpool fine, $2 50 per sack.
Saltpeter.—17c. to 21c. per lb.
Spelter.—9c to 9¼c. per lb.
Steel.—English, 20c. to 28c. per lb.; German, 10c. to 17c.; American blister, 12c. to 18c.; American spring, 11c. to 14c.
Sugar.—Brown, 11c. to 15¼c. per lb.; White, 16c. to 17¼c.
Tea.—35c. to $1 45 per lb.
Tallow.—American, 12¼c. per lb.
Tin.—Banca, 51c. to 52c. per lb.; English, 42½c. to 43c.; plates, $9 25 to $13 50 per box.
Tobacco.—Bags, 14c. to 30c. per lb.; Cuba fillers, 90c. to $2; United States wrappers, 15c. to 45c.; Manufactured, 25c. to 90c.
Wool.—American Saxony fleece, 80c. to 85c. per lb.; Merino, 72c. to 80c.; California, 25c. to 55c.; Foreign, 16c. to 60c.
Zinc.—12c. to 12¼c. per lb.

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CULTIVATING LAND BY STEAM.

For some inscrutable reason the project of cultivating land by steam in the country appears to have fallen into disrepute; at all events no efforts, that we know of, are being made to further the object. Some years ago inventors were fully alive to the importance of this subject, and many steam plows were exhibited in different parts of the country, the result of their performances being duly chronicled in the SCIENTIFIC AMERICAN. For a long period, however, the matter has slumbered, and it seems as though it were now quite time to revive the project. We do not think we are premature when we say that before many months there will be a tremendous demand for agricultural implements of the best kinds and on the most improved principles. The revolution now going on in the political institutions of the country, which will leave the national skies brighter and clearer than they were before, affords a convincing proof of our statement; for upon the withdrawal of the former laborers who tilled the Southern fields from the relations they once held, a steady and overwhelming demand must arise for improved agricultural tools. It cannot be otherwise; and among these some sort of a steam cultivator must be brought out. It is not imperative that this cultivator should be a plow in form; on the contrary it may be of any nature or character, so that it performs its office—to loosen the earth to a specified depth. A recent writer on this subject makes the following suggestions:—

By the invention of a rotary digger—that is to say, a cylinder revolving on a shaft supported at each end on a frame, on the principle of a common farm or garden roller—that cylinder to be filled with spiked or claw-formed teeth; and, by its rapid revolutions, these teeth must dig up the ground six to twenty inches deep, as may be desirable, leaving the ground light, free and thoroughly pulverized, to receive the seed of whatever kind. A drill may be attached behind it, for the purpose of sowing or planting the seeds, if necessary. This, in short, is the grand desideratum which we look for in the perfect cultivation of the soil. The earth, by this operation, will be loosened as far down as the machine goes, and the subsoil, beneath what is loosened, will not be packed still harder than it laid before, as with the plow. It will be readily seen that, in this proposition, the plow is superseded entirely, as it should be in all free soils, and an instrument of altogether another kind has to take its place.

Now, can this implement be invented and perfected for practical and easy operation? We think so. It need be no more complicated than a reaper or a mowing machine. It may be made to work by either horse or steam power.

Can the small farmer use such a machine economically, even if it be invented and perfected? We believe so, if his land be free from stones and roots. Its portability and compactness will render it easy to manage, and the celerity with which he can get in his crops by its aid will enable him to clear his land from impediments to its working, which the dilatory and only partial labor performed by the plow would not. The great advantage of such a machine, however, would be in the vast prairie cultivation of the Western States, on broad river bottoms, and in large fields, where the surface lies smooth, free from stones or other impediments, and where a timely cultivation and deposit of the seed is indispensable to successful cropping. Sugar and cotton lands, as well as those for corn, wheat and other grains, will be immensely benefitted by this rapid cultivation.

It is an unpardonable offence against the inventive genius of the country to say that a steam cultivator, call it a plow or what we may, cannot be produced. The need for it exists, that is palpable; from east, west, north and south the complaint comes that labor is scarce and high. Would not the evil be compensated for by the introduction of steam cultivators? The men who have gone forth to till the great fields of war will, many of them, never return; laborers will command their price and a high one too, long after the strife is over; but in any event the progress of the country in other respects demands that steam cultivators should be in use, and as generally as those now drawn by horses. Who will produce a successful steam cultivator?

Joint-owners of Patents.

We invite the attention of our readers to the important decision of the Supreme Court of Massachusetts, published on another page, affecting the rights of joint-owners of patents. The question settled by this decision has frequently been put to us, and it was discussed at some length on page 42, Vol. III. (new series), SCIENTIFIC AMERICAN, substantially the same views being there presented. We believe, however, that this is the first judicial decision upon this important point. It may be summed up briefly as follows:—One joint-owner of an interest in a patent right cannot maintain a bill in equity against another joint-owner, to compel contribution of a portion of the profits of sales of the patented article, *in the absence of a special agreement to that effect.*

We have given, in our report, not only a brief statement of the case, but also the full opinion of his Honor Judge Chapman. If any of our readers have occasion to examine the authority, they will find the report published on page 226, 4th volume Allen's Massachusetts Reports.

GOVERNMENT ORDNANCE EXPERIMENTS.

[OFFICIAL.]

Practice at Iron-Plate Target No. 37, Faced with India-Rubber.

PENCOTE BATTERY, May 18, 1863.

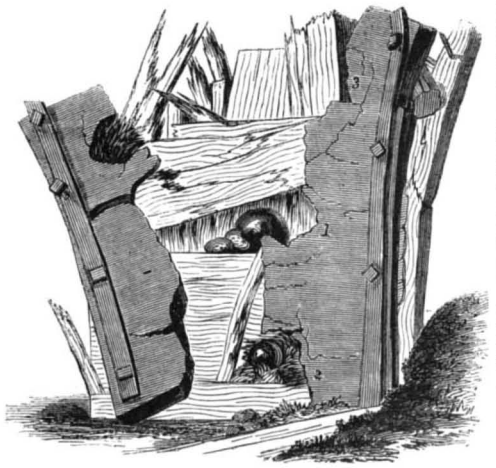
This target was made of one 4½-inch scrap-iron plate, backed by 20 inches of solid oak. On the face of the plate were placed four thicknesses of one-inch rubber plates, the whole being fastened together with eight nut bolts with square heads. The target was placed against a bank of solid clay.

DIMENSIONS.—Plates, 8 feet long, 4 feet wide, rubber, 4 inches thick; plate, 4½ inches thick; timber, 20 inches thick.

Gun, XI. inches, No. 214 (A. F.); charges 30 lbs. of cannon powder; projectiles, cast-iron solid shot—two-thirds Cloverdale iron, and one-third Hopkins's iron.

No. from gun.	No. to-day.	Charge.	Weight of Projectile.	Insertion	Recoil.	Time Fired.	Distance to Target.	REMARKS.
		lbs.	lbs.	in.		P.M	ft.	
164	1	30	169 50	106		2·58	87	
165	2	30	168	106	Taut	3·10	87	
166	3	30	168	106	Breeching.	3·25	87	

The first shot struck near the center, and 17¼ inches from the right-hand edge and 16¾ from the left-hand edge of the plate, passing through the rubber and plate, and imbedding itself in the second course of timber, with its rear 9¾ inches from the outer surface of the plate. All the rubber was forced off and fell about 15 feet in front and a little to the left of the target. The rubber plate nearest to the iron was the



only piece that was separated in two parts. Diameter of shot-hole in the iron, 14 inches. Seven inches and a half above the shot hole there is a crack in the plate 21 inches long, extending crosswise the target, and 5¼ inches below the shot-hole is also a crack extending downward 20 inches; three timbers in the last course are broken, and two driven back 3½ inches on the right-hand side, and 2½ on the left-hand side.

SAME TARGET WITHOUT RUBBER.

The second shot struck 17 inches from the right-hand edge, 16 inches from the left-hand edge, and 21 inches below the first shot-hole, passing through the plate, and imbedding itself in the third course of timber with its rear 17 inches from the outer surface of the plate. The plate is cracked across from the right to the left edge of the plate, and from this shot to shot hole No. 1. The lower edge of the plate was started forward from the timber 2½ inches. The timber in the rear is somewhat shattered.

The third shot struck the plate in the middle and near the top edge, splitting the plate from the top to bottom, separating it at the top five feet and breaking the plate into six pieces. One piece of the shot weighing 86 lbs. was found 52 feet in the rear of the target. Some of the fragments of the plate were thrown 45 feet to the rear of the target. One large piece of timber was thrown to the rear, passing through a fence, carrying away eight palings, and lodging against a stump 165 feet from the target. Another piece was found lying 80 feet from the target. The timber backing is shattered to pieces. None of the bolts were broken. The damage to the target by first shot was quite as great as all other first shots (XI. in.) at similar targets.

PRICES IN DIXIE LAND.

Between the high prices for living and the wholesale depreciation of the trash they call money, the confederates are certainly in a bad way. We have before us a recent number of a dingy coffee-colored sheet called the "Richmond *Examiner*;" in one column there are market reports, which must be appalling enough to those who consult them with a view to purchase. The reader who is disposed to grumble at prices here in the loyal and happy portion of the country, will please fancy himself in Richmond and about to buy a barrel of flour. The price is only $120, and we are told by the paper quoted that it is "arriving more freely." It would seem that it is all to be sold at the same price; but the less that came the better it would be for the "secesh." Irish potatoes are only $12 per bushel; turnips are "dull at $5 per bushel;" no doubt they would be very dull here at that rate; Peas and Beans $20 per bushel, and onions $30 per bushel. Between bacon and beef there is as much difference in price as there is in the quality of the two comestibles, the pork being $3 per pound, while fresh beef is but 90 cents. Butter is $4.50 per pound, and we may add—such butter; lard $3 per pound, and poultry $1.25 per pound. Apart from other considerations Christmas must have been a dull day in the Confederacy. Brown sugar sells at $3.50 per pound, molasses $14 per gallon, and at the tail of the report—*Whisky* $75 per gallon; in the expressive language of the rebel editor, "mean at that." We had nearly forgotten to remark upon one significant item—that of salt. An advertisement is headed "Salt notice" which seems quite appropriate—

SALT NOTICE.—ALL CITIZENS OF HENRICO County entitled to salt will call at the County Court House and get their portion—eight pounds to each person, at fifteen cents per pound. Salt bags can be had at $5 each.
ELIJAH BAKER, Agent.

Salt allotted to each individual at the rate of eight pounds! and fifteen cents a pound too! Even that quantity is not sufficient to save the Confederacy.

These prices are sufficiently high to shock the finest nerves; but what must be the feelings of the rebels when they see that not only food obtains an hundred prices among them, but that their rag-money goes down in the same ratio. Messrs. Davenport sold $130 in gold at $18½; that is $18.50 of rebel paper for one gold dollar. Why, at this rate secesh money is doubtless cheaper to paper walls with, if it were clean, than the best imported hangings!

But if there is scarcity of food for the physical man in the Confederacy, there is no lack of food for reflection, and that of the bitterest flavor. On every side the New Year ushers in portents of the speedy fall of the iniquitous combination. In the last agonies of dissolution, both political and social, there seems but little left to do but give the finishing stroke, and clear the country for the establishment of the lawful government. Doubtless the President and his advisers understand this much better than we do. We may add, in the mysterious language of the army correspondents when our forces are idle, "If people only knew what plans are now about to be executed they would cease grumbling." Let all those who are disposed to criticise and complain of the conduct of the war look at the rebel market reports and the condition of the rebel currency, and contrast the state of the North with that of the Confederacy; they must be obstinately bent on destruction if they see anything to admire in the state of affairs which now exist there.

THE number of rebel vessels, steamers and sailing vessels, both in the navy and outside, which have been destroyed and captured by the United States navy, from May 1st, 1861, to November 1st, 1862, is, in round numbers, 1045. A large number of small craft are not included.

A PARTY of enterprising Bostonians have bought the lead mines in Southampton, Mass., which were discovered in 1765, and with a capital of about $500,000, and a force of about seventy men, have commenced developing their resources.

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The Discoverer of the Use of Bromine in Photography.

To John Frederick Goddard, of England, we are indebted for the first discovery and publication of the use of bromine in photography.

Daguerre, after many years of experimental labor, announced his discovery, in January, 1839, and showed specimen pictures; but in his hands the process was only able to delineate still-life objects; for an exposure of twenty minutes or halfan hour, with bright sunshine, was required.

When the particulars of Daguerre's process were published, Professor Morse resided in Paris. He communicated the details to the scientific men of New York, many of whom immediately commenced experiments; and, among others, Messrs. John Johnson and A. Woolcott, with a view to take pictures quicker, devised a camera with a concave mirror, instead ofa lens, and the plate was placed in the focus of the mirror. By this means they were able, so early as October, 1839, to take a profile portrait of Mr. Johnson, with only *five minutes'* exposure in the bright sunshine. Early in 1840, Mr. Johnson, Sen., came to Europe with a few of the likenesses, and Mr. Beard united with him in taking out letters patent for the reflecting camera. This was Mr. Beard's first introduction to photography.

As neither Mr. Beard nor Mr. Johnson were men of science, but engaged in commerce, they felt it necessary to secure a competent person to bring out their new camera. Mr. Goddard, who was already familiar with the Daguerreotype process, entered into the project with zeal, engaging himself to undertake experiments to test the value of the new instrument, and also to endeavor to improve the process itself.

In 1840 Mr. Goddard discovered the extreme sensitiveness of the se of bromine and iodine, a discovery which reduced the exposure from minutes to seconds, and permitted pictures to be produced in a subdued light. This valuable discovery was published in the *Literary Gazette*, December 12, 1840. Mr. Goddard saw at once the value of his discovery in a commercial sense, and recommended Mr. Beard to purchase the patent from Daguerre, in whose hands it still remained; and also to abandon his reflecting camera as no longer necessary, but to use lenses, by which larger and better pictures could be obtained. Mr. Beard had the wisdom to avail himself of these suggestions, and from this time dates the commencement of a new industrial art—professional and commercial photography.

After this, Mr. Goddard instituted an elaborate series of experiments on the haloid bodies. Iodine, bromine, chlorine and fluorine, and in February, 1841, he deposited a paper in the archives of the Royal Society, detailing his sensitive process of chlorine with iodine for taking portraits from life. With the exception of M. Fizeau's method of gilding the plate, no vital discovery was ever afterward made in daguerreotype; all other improvements were but matters of detail.

The introduction of bromine into photography enabled it to pass from a curiosity of the laboratory to be one of the proudest discoveries of the nineteenth century. It became immediately a new and unique source of happiness to mankind—a boon and a blessing to all brought within its influence. Due honor has been rendered to the great prime movers—Daguerre, Fox Talbot, Archer—but the claims of one still living amongst us, who found the art at a dead-lock and who gave it an impetus which it has never lost, are not so well known. They have never been so fully stated as in this paper, and, perhaps, would not have been so urgently made now, but that the worst part of the story has yet to be told—this worthy man is in want! He is old and frail; he has well-nigh reached the Psalmist's "threescore and ten;" and he is in penury—literally without means—and is living on charity.

It is proposed to raise a fund to relieve the necessities of this deserving gentleman; and appeal is made to all photographers to honor themselves and their craft by rendering the few remaining years of this early father in photography free from at least the anxieties of physical want.

We copy the above from the *Photographic News* (London). We most cordially second the appeal there presented in behalf of Mr. Goddard. The importance of his discoveries cannot be over-estimated. We hope that the photographers of this country will not be backward in raising a substantial token of their appreciation and respect. Who will have the honor of moving first in this matter?

PRACTICAL MANAGEMENT OF FLAX.

The Dublin *Irish Agricultural Review* contains an account of a meeting of the North-East Agricultural Association of Ireland, at which a valuable paper on the management of flax was read by the Rev. Joseph Bradshaw, chairman of a special committee for promoting the growth of flax. As the management of flax is now engaging the attention of our farmers and manufacturers, because there is a great demand for it, to be employed in the manufacture of various fabrics and articles, we condense the substance of Mr. Bradshaw's paper; especially, as he asserts, it is an appropriate subject for the present season of the year:—

Many never think of the flax pool until the flax is ready for pulling, when it may be too late to remedy such a want of foresight. The winter season, when other work is not pressing, is the right time to make provision; all, therefore, who contemplate cultivating flax next year for the first time, or who are not satisfied with their experience of former years, should at once, without delay, set about selecting a proper situation for the steep-hole or pool. Situation is very important, much more so than many experienced persons are aware of. It should be chosen with a view to warmth and a command of water; all other considerations should be looked upon as of little importance compared with these; for on a warm, well-sheltered pool, with a power of turning on and off as much water as you may require, will depend in great measure the quality and yield of the fiber, and, as a consequence, the success of your whole undertaking. I have known instances where a few yards, and even feet, have caused a material difference in the watering.

To many this difference seems wholly inexplicable, and the only account they can give of the matter is, that it is so; that it is most singular, and beyond their comprehension. A little patient investigation would, I believe, solve the difficulty; for although I have seen or heard of this curious phenomenon, yet after inquiry and observation I have in most instances been able to assign an adequate cause. An old ditch, especially if the ditch bank or dyke be to the north, may be the best; but, should the richest land you have be the best situation, do not hesitate to take it; the flax will do more than pay for the difference. If you can have access to both sides for loaded carts, you might make the pool from fourteen to sixteen feet wide; but, if only one side is available, from eight to ten feet will be found to be convenient widths. The sides should be a little sloped, to guard against their slipping in when the weight comes upon them, for which reason it is advisable not to cart along the edge, provided you can conveniently avoid it. The proper depth is about four feet on level ground; but, should it be on a considerable incline, it may vary from four and a half feet at the lowest end to three feet at the upper. The land on each side should be thorough-drained, taking care, however, that no water from the drains gets into the pool. If the soil be very porous it may be found necessary to take means of guarding against escape, which will best be done by cutting a deep and narrow trench parallel to the sides, and some three or four feet from them, then ram this trench with clay. No pool should be larger than can be filled in the same day, for it must not be forgotten that the flax first put in is last taken out. By placing a few stakes across, and ramming in sods and clay above them, a dam or weir can be formed at any required point; the pools are finished and made complete six months before harvest.

In most cases the pool is allowed to be filled with water to the required hight—about three and a half or four feet; the flax is then put in, beginning at the lower end, or where the water is deepest, in regular rows across the drain, with the root end down, resting on the bottom and standing nearly upright, so that when filled it presents the appearance of a dense crop, with the seed bolls just over the surface of the water. To do this properly requires a little care and dexterity. If it is filled from both sides two loads should be emptied down, one at each side, and then a man at each side should begin at the same time by taking a beet, as a sheaf of green flax is provincially called, and casting it into the middle lengthwise; the next one close to it and in exactly the same position, and so on to the edge of the pool at his feet, where he ought to crush the last one rather tighter, and occasionally put an additional one in on the flat, or indeed regularly the whole length of the pool, to compensate for the tightness. Great inconvenience frequently arises from want of attention to this, for when the flax begins to ferment, it casts the sods or stones placed on it to the slack part, where they find their way to the bottom. For this reason also I prefer putting the flax pretty tight all through. It economises space, too. Another method is to put the flax in before the water, which is certainly a good plan, as it can be done with great regularity. One man stands in the drain and has the beets handed to him, which he places in the way pointed out, root end down, in regular and compact rows across. When the pool is deeper at the low end than at the top, care must be taken to slope the flax gradually more and more toward the shallow end, so as to have the tops of the beets level, and of a uniform depth below the surface of the water. When it is put in dry the weights should be placed over it before water is let in. The whole should be covered with sods or stones, equalizing the weight as nearly as possible all over. If sods be used, the green side should be placed next the flax; but the inconvenience and expense of procuring these every season, especially where there is a large quantity of flax grown, induce most farmers to prefer stones instead, as the stones can easily be built up and kept for future use.

If the weather be warm, fermentation will set in immediately. About the second or third day the flax will begin to swell up, and the more it does so the more favorable are the indications of its going on well. Care, however, must be taken to keep it down below the surface of the water; let none of it appear above; and if trampling or pushing it down be not sufficient, additional stones must be placed on; and should even this fail, let in additional water. There should always be about two inches of water over the surface. In two days after the fermentation has reached its hight, it begins to subside, and the flax to fall down to the bottom. Care should now be taken to let water off, and if need be, to take some of the weight off also, as it is not desirable to have it pressed down too much when settling into the decomposed state. A small stream, say about the thickness of a man's wrist, passing through the pool, carries off the dark fetid water, and is considered to improve the quality and color of the flax.

Now comes the critical period to decide when it is watered enough—neither overdone nor underdone. And here at times the most experienced and skillful hands are at fault; a prudent farmer will take a great many things into consideration before deciding upon the indications of the one great test—whether, for example, the flax grew well and is a good sample of a healthy strong fiber; whether the weather is very warm, the steep-pool favorably situated, filled with soft water, free from all deleterious matter such as lime, iron, or lead ore; whether fermentation set in immediately, and worked well and violently, and then as quickly and quietly subsided. And if he knows that all these things have occurred, he concludes that he ought to be very watchful. He examines on the seventh, or at the farthest, on the eighth day, in the following manner:—Having removed some sods or stones, as the case may be, about the middle of the pool, he pulls up a beet as gently as possible and places it on the edge, and in doing so, notices whether the seed bolls drop off freely; he then gives it a good shake at the end, and if all the seed drops off completely, he concludes this to be one favorable sign. He next grasps as much as he can hold firmly in his hand, and, if it feels soft, clammy and compliant, and does not separate when he opens his hand, but, on the contrary, that it sticks well together as if half glued, requiring a little force to separate the stalks, he concludes this to be another favorable symptom, and then proceeds to the final and important test by taking some six or eight stems out of the center of the beet, and bending them rather sharply over his forefinger, holding the end firmly with his thumb; if the stem breaks under this operation, and the shove or inside part starts out like a broken bone, he concludes that the flax is done. It will almost invariably be found that in applying this last test the stem will be brittle at the root end first, and get less and less so as you approach the seed end. It is best, therefore, to begin at the root and proceed upward, and if you still find it brittle to the middle of the stem, you may be sure it is done. I need scarcely say that the opposite, or a modification of all or any, of these indications or tests would point out that the time had not arrived for taking it out. It should be examined morning and evening until found ready. I have never had any under eight, and seldom more than twelve days in the steep. All the flax, for example, this year,watered in the month of August when the weather was warm, went on regularly and well; whilst the cold chilly nights of September had the most injurious effect, by at once checking fermentation. In a case of this kind there seems no help for it but to take it out in fourteen or fifteen days, half done as it is, and trust to the grassing for finishing it. We ought to learn, however, from such examples not to be late in the season, lest we lose our whole crop. Many farmers are in the habit of taking the stones or sods off, and allowing the flax to float for twenty-four hours before taking it out, as this seems to hasten it at the last. I have no doubt the theory is correct and the practice a good one, but should never be practiced by any except those sufficiently experienced to know when the flax is all but done. In taking the flax out run off about half of the water, then remove the weights and proceed to throw the beets on the edge, on one or both sides. There can be no doubt that to pitch it out with the hands is best, but an ordinary hay fork with the toes turned will answer the purpose, only the toes should not be very sharp, lest they cut the fiber. With this instrument the man draws the beets to him, placing a toe on each side of the band, and so lands them on the edge, where another man builds them in a regular heap,ready to be carted to the spreadground. Some allow it to remain twelve or twenty-four hours in the heap; but the sooner it is spread the better.

United States Naval Observatory.

The report of Captain Gilliss, Superintendant of the United States Naval Observatory, which accompanied the report of the Secretary of the Navy, contains some exceedingly interesting facts. The value of a complete outfit of a vessel, with nautical instruments and charts, is $913. During the year, sixty-eight vessels were thus supplied, and one hundred and two had partial equipments, at an average cost each of $310. When the war commenced the navy relied almost wholly upon foreign workshops for certain classes of instruments, and not less than four-fifths of the annual appropriations were sent abroad in payment for chronometers, sextants, spy-glasses, &c. But the case is now wholly changed; our own mechanics are able to make all classes of instruments of a better quality and at a less cost than the imported ones. The United States Coast Survey has published 15,780 charts during the year. It has been an invaluable aid to the blockade service. The appropriation asked, for instruments, books and foreign charts for the next fiscal year, is $101,042. Captain Gilliss gives an interesting account of his astronomical observations, and mentions incidentally that his predecessor, Lieut. Maury, left ten years' observations unreduced. They are now, however, ready for the printer. The total appropriation asked for is $135,284.

BURSTING OF AN 8-INCH COLUMBIAD.—On Tuesday afternoon, while some experiments were being made at the Frankford Arsenal, Philadelphia, of a new projectile called an "acceleration cartridge," for the purpose of testing which an 8-inch columbiad was used, an accident occurred, and it is almost a miracle that a number of persons were not killed or wounded. After one of the discharges the gun burst and was instantly converted into a great number of fragments. Pieces flew in all directions, and singular to say, although about fifty people were standing within range of the scattered fragments, some of whom were close by the gun, no person was in the slightest degree hurt.

ARCTIC WHALERS.—Twenty-four of the Arctic fleet of whalers have arrived at Honolulu, averaging each 1,160 barrels of oil and 400,000 pounds of bone. Whales were very abundant during the latter part of the season—the water was perfectly alive with them. Hundreds of vessels could easily have been filled with them without perceptibly diminishing their number.

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Correspondence

Inoperative Feed Pumps.

MESSRS. EDITORS:—Having from time to time seen correspondence upon engineering and mechanical subjects in the SCIENTIFIC AMERICAN, I take the liberty to forward you my experience with a feed pump to a steam boiler, hoping that it (the experience, not the boiler) might prove serviceable to your readers. In March last the water in one of our cylinder boilers kept getting lower and lower until they ceased to be safe to work. The difficulty was an imperfect operation of the feed pump: the plunger was well packed and the valves apparently in good order; the water was clean and there seemed to be no reason why the pump should not work. Several times the engine was started, but to no purpose, as the pump still refused duty. After much delay, I found on examining the spindle of the feed valve (the seat of this valve had a bridge across it on the bottom, in which a stem on the valve worked to guide it up and down) that it was bright on the end, as if worn. On looking in the valve chamber the source of the difficulty was plainly traced, as the stem rested on the bottom of the chamber and kept the valve off its seat. The valve seat must have worked down, I think, in some way, as the pump had always operated well before. Of course, when I filed "clearance" on the stem there was no further trouble. Hoping that this may be of service to your readers, I send it for your journal. I have many times received much valuable information from a perusal of your correspondence and know a number of my acquaintances who can say the same. J. H. R.

Troy, N. Y., Dec. 24, 1863.

[We are under great obligations to our correspondent for his courtesy, and shall be glad to hear from him again. Engineers and mechanics in general should forward us their views on subjects connected with their profession: if novel and practical we shall take pleasure in laying them before our readers.—EDS.

Morgan on Speculative Science.

BARNUM'S MUSEUM, Dec. 31, 1863.

MESSRS. EDITORS.—I am informed that the writer of the enclosed letter is a gentleman over eighty years of age. Although I decline entering into any "outside operations" (since the clock speculation) it strikes me that the hints contained in the letter may prove suggestive and perhaps valuable to some of your scientific readers, and may lead some person to correspond with Mr. Morgan to their mutual profit. I hope for these reasons that you will find a place for the letter in your valuable paper. P. T. BARNUM.

PORTLAND, Me., Dec. 26, 1863.

MR. BARNUM.—Among all your various speculations if you would like to speculate on a course of scientific lectures, I can give a course of six lectures on the True Theory of the Natural Philosophy of the Great Universe, the Solar System, the Composition of Matter, its Composition and Decomposition, and what Matter is, embracing the following particulars: 1. That light is matter. 2. That all matter is the recomposition of decomposed light. 3. That light consists of 161 distinct kinds of matter, perhaps more. 4. That Newton's 7 prismatic colors are true, and probably contains 14 more invisible rays, and perhaps 21 more invisible rays that cannot be detected. 5. That Newton's push that set the great universe in motion is not true. 6. That the two magnetic forces are the true cause of motion and stability, and the composition and decomposition of all matter. 7. That electricity is the true cause of all motion. 8. That the old Chaldean and Ptolemaian philosophy, endorsed by Newton and now taught in all the schools and colleges, is false. 9. That the sun is, in fact, as intensely cold as Newton rated him to be hot. 10. That cold and not heat is the natural state of matter. 11. That all heat is the result of friction. 12. That the magnet divided makes the galvanic and the electric forces, and they united make the magnet. 13. That the electric and galvanic forces are not a unit, but entirely different, performing different offices in the great universe, the solar system, and in the composition and decomposition of all animal and vegetable bodies. 14. That all matter, in whatever form of composition, is essentially alive. 15. That the two grand divisions of matter are into fluid and stationary. 16. That another grand division of matter is into male and female and runs through all nature, and that all nature, in every department, goes in this pair, in some form accounting for all the sympathies and antipathies of nature. 17. That when we find a pair, in any department, we find the whole. 18. That the undulation of light is false. 19. That Newton's centripetal and centrifugal forces are false, having no philosophical foundation. JONATHAN MORGAN.

Language of Insects.

A most singular discovery, the credit of which appertains, we believe, to Mr. Jesse, is that of the antennal language of insects. Bees and other insects are provided, as everybody knows, with feelers or antennæ. These are, in fact, most delicate organs of touch, warning of dangers, and serving the animals to hold a sort of conversation with each other, and to communicate their desires and wants. A strong hive of bees will contain thirty-six thousand workers. Each of these, in order to be assured of the presence of their queen, touches her every day with its antennæ, Should the queen die, or be removed, the whole colony disperse themselves, and are seen in the hive no more, perishing every one, and quitting all the store of now useless honey which they had labored so industriously to collect for the use of themselves and the larvæ. On the contrary, should the queen be put into a small wire cage placed at the bottom of the hive, so that her subjects can touch and feed her, they are contented, and the business of the hive proceeds as usual. Mr. Jesse has also shown that this antennal power of communication is not confined to bees. Wasps and ants, and probably other insects, exercise it. If a caterpillar is placed near an ant's nest, a curious scene will often arise. A solitary ant will perhaps discover it, and eagerly attempt to draw it away. Not being able to accomplish this, it will go up to another ant, and, by means of the antennal language, bring it to the caterpillar. Still, these two, perhaps, are unable to perform the task of moving it. They will separate and bring up reinforcements of the community by the same means, till a sufficient number are collected to enable them to drag the caterpillar to their nest.

Autumn woods in the South.

A letter from Tennessee contains the following: In vividness and variety the autumnal colorings of Southern woods far surpass our own. It may be that the keen shafts of green thrust up here and there serve to set off "the coat of many colors." You can see cones of hills that burn like strange and wonderful gems, and would put out the light in Sinbad's Valley of Diamonds; great trees, whose entire foliage resembles a single crimson or golden flower, so evenly and wonderfully are the tints laid on, and all you can think of, as you look, is not a trunk of a tree bearing up its crown of pointed leaves, but a stem lightly lifting its one majestic blossom up before the Lord. I saw such trees and woods, touched and set on fire by the sinking sun, last night. I had read in an old volume of the Burning Bush, but I never saw it until then. How they did kindle and flash up as the Day walked along the tops of the forests to his chamber! I believe that if ever I shall have to take up blind Milton's "but not to me returns day, not the sweet approach of even or morn," that scene will come back to me again and again—one of the brightest and loveliest pictures in memory. I pray all "practical" men and women to pardon me for strewing the threshold of this letter very broadly with such trifles as leaves and flowers. But I cannot help thinking, with another, that the Lord loves to look at them Himself. Would anybody have liked it better, do you think, had I told him how I saw oak leaves, as early as September, more richly colored than any I saw last night!—costing far more than the dye of Tyre? Leaves splashed with Federal blood.

THE number of anatomical specimens collected in the National Army Museum already exceeds a thousand, and it is declared to be the most interesting collection in the world. They have all been collected from the battle-fields of the rebellion, and illustrate the character of the wounds from every variety of weapons.

FAST STEAMSHIPS IN THE NAVY.

A recent article in a daily paper, apparently from, or dictated by, the naval authorities, states that on the the first day of the new year the United States possessed the finest navy of any power in the world. From an inspection of the article it appears that the successful vessels have been built principally by naval constructors. These gentlemen have been so often attacked in print for their short-comings, that we take pleasure in publishing some slight refutation of the charges which have for years been alleged against them; for the actual performance of the new sloops is exceedingly creditable, if the record be a true one.

"As early as 1855 the Navy Department became impressed with the necessity of having a fleet of formidable steamers, able to steam with velocity, and whose success is the more gratifying from the fact that all previous efforts on the part of our authorities in the same line had proved disastrous failures. Congress was asked to make an appropriation for the construction of five immense propellers, and it made it. The vessels were; the *Niagara*, *Wabash*, *Colorado*, *Minnesota* and *Merrimac*. It is no exaggeration to say that in all respects these vessels were absolute and unmitigated failures. The *Niagara* alone was remarkable for any speed, and in her famous race with the *Agamemnon*, the then "crack" ship of the British Navy, won the applause of English and American naval constructors. The *Roanoke* cost over a million of money, and, after all, could not be kept in a seaworthy condition, having been finally cut down to the water's edge and plated with iron. The *Merrimac* was getting out of repair every six weeks, during her cruise on the Pacific. The *Colorado* was equally unfortunate, and if the *Minnesota* and *Wabash* were less unsuccessful, their usefulness had been of a very secondary character. The failure of these vessels was attributed chiefly to their great size; and Congress and the Secretary of the Navy endeavored to repair the damage done the country by building these vessels, in the construction of another fleet. This consisted of the following:—*Lancaster*, *Pensacola*, *Brooklyn*, *Hartford*, *Richmond*. In point of serviceableness this fleet was by all odds the most valuable ever constructed for the Navy of the United States. The names of the vessels comprising it have gone into history, and when future generations shall read of the opening of the Mississippi River and the capture of New Orleans, the *Brooklyn*, *Pensacola*, *Hartford* and *Richmond* will excite astonishment, on account of the immense battering they received without serious result. But in point of speed these vessels were not remarkably successful. They can all, of course, steam nine nautical knots an hour, but we doubt whether any of them has made more than that. The *Pensacola* has been particularly unfortunate, in consequence of some blunders made in her machinery by parties who are now criticising the Government without measure. The *Brooklyn* was the only ship of the class built by contract, and she is probably the best of the lot. The *Richmond* rolls fearfully—in fact almost as much as any iron-clad vessel yet launched. After the completion of this fleet the Government were so well satisfied with their success, which was somewhat commonly attributed to their comparative smallness, that another fleet of steamers were built, which may be called half gunboats and half screw sloops. Their names are as follows:—*Mohican*, *Narragansett*, *Iroquois*, *Pawnee*, *Wyoming*, *Dacotah*, *Seminole*. These vessels succeeded remarkably well. The *Seminole* was a failure, because the material put in her hull was bad; but none of them, except the *Iroquois*, made more than ten nautical miles an hour. That vessel, however, made from ten to thirteen nautical miles an hour—a speed which has been unprecedented in our navy, but which the last year has thrown into the shade. The *Mohican*, *Wyoming*, *Dacotah*, and *Narragansett*, have been the most successful cruisers—proving how admirrably both their hulls and machinery were built. The *Iroquois* was also very successful. The *Pawnee* was an admirable sea-boat, but her machinery was badly built in Philadelphia, and its failure was erroneously thrown on the entire ship. Besides these, a side-wheel steamer, called the *Saginaw*, was built at the Mare Island (California) Navy Yard, and was more of a failure than any vessel ever built for the U. S. Navy—it having been impossible to fire her guns without shaking her to pieces.

The above fleet constituted the entire steam nava

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force of this country, excepting a few purchased steamers, at the time the war broke out. The first want perceived by Secretary Welles, when he took charge of the Navy Department, was a number of shallow vessels, capable of navigating the rivers of the South. He at once went to work and built the following fleet of gunboats:—Ottawa, Pembina, Seneca, Chippewa, Winona, Unadilla, Wissahickon, Sciota, Itasca, Huron, Chocura, Sagamore, Katahdin, Marblehead, Taoma, Pinola, Kanawha, Owasco, Kennebec, Aroostook, Kineo, Cayuga, Penobscot.

These craft were very hurriedly got up, having, we believe, been entirely finished in something like three or four months. Speed was not considered one of their indispensable attributes, and the contractors for their hulls and machinery had only ordinary work to do. Under the circumstances they did it pretty well, and the vessels are now all on active service, none of them having proved an absolute failure.

Another fleet was then built by the Navy Department at the different navy yards. No particular orders were issued to have them fast, and if any of them have gone over the average rate of speed it is as much by chance as by premeditation. The following is the list:—Kearsage, Ossipee, Housatonic, Wachusett, Juniata, Tuscarora, Adirondack, Oneida.

We now come to the efforts of the Government to build fast vessels. The first adventures of the *Alabama* so startled the commercial public that there was a general outcry for fast war vessels. This was early in 1862, and the Navy Department set at once to work to provide a fleet capable of overhauling and catching her. We built three types of vessels. The first, a fleet of screw sloops, are as follows:—Ticonderoga, Lackawanna, Canandaigua, Shenandoah, Sacramento, Monongahela.

It is in the experience of these vessels that we must look for their success or failure. It matters little to the public and to the Government whether they are provided with this or that technicality, so long as they have been fast or as fast as could be expected. The *Lackawanna*, after having repaired a temporary accident which occurred at the Brooklyn Navy Yard, went to sea and made over 12½ to 13½ miles an hour for 15 and 20 hours, at different periods; and the record of these facts may be found in the Navy Department at Washington. The *Ticonderoga* was still faster, having made no less than 14 knots an hour, as is stated in a letter received by Mr. Delano, the Naval Constructor of the Brooklyn Navy Yard, from one of the engineers of the ship. The vessel left St. Thomas, West India Islands, for Philadelphia, on a given day, and from that time until her arrival at her destination made, whenever her officers pleased to put her to her speed, 14 nautical or 17 ordinary miles an hour. This is a speed unequaled in all vessels constructed for this Government, and makes an era in the history of our Navy.

The *Shenandoah* was somewhat unsuccessful in her initiatory attempts to leave Philadelphia, but having got fairly to sea, is doing very well. The *Sacramento*, built at Portsmouth, N. H., has made 13 nautical knots or 14 ordinary miles an hour, as may be seen in a letter from Capt. Boggs, her commander, to a distinguished officer at the Brooklyn Navy Yard. The experience of the *Monongahela.*, and the exact speed made by the *Shenandoah*, we have no facts about; but as they were built on exactly the same principle as the *Sacramento* and *Ticonderoga*, to nothing save imperfect building of the engines or hulls must their failure be traced. If they had failed in speed, however, we should have heard it; and the impression is general that they are making 11 or 12 knots an hour. From the *Canandaigua*, built at Boston, we have a letter stating that she made for 11 hours consecutively, namely, from 1 o'clock in the afternoon till 2 o'clock in the morning, 12 nautical knots an hour. This, the first fleet built for speed, has been a most admirable and definite success, and it is impossible to consider the hurried manner in which the vessels were built without awarding great praise to those who conceived and executed them. It may be right to say that they were built at navy yards, which of course is a strong argument in their favor.

Another fleet of side-wheel steamers were built for river service, many of them being double-enders, but they were not built for speed; yet each and every one of them has been most successful in cruising—the *Port Royal* having frequently made 13 nautical knots an hour; the *Sonoma*, which was here a few days since, very often steamed 13 nautical knots an hour, and we understand the *Tioga* and *Octorora* are equally successful. The names of the vessels are as follows:—Tioga, Tennessee, Sonoma, Mahaska, Paul Jones, Port Royal, Miami, Cimerone, Octorora, Conemaugh.

The next class of vessels to be named should be treated most critically, as Government conceived them with the determination to make them fast, and issued the most stringent instructions to the contractors to insure that characteristic. They are not intended to be ocean steamers generally, being intended more for coast service, chasing privateers and cruisers, etc. They are as follows:—Ascutney, Agawam, Iasco, Lenapee, Mattabesett, Mingoe, Massasoit, Metacomet, Mendota, Mackinaw, Otsego, Osceola, Pontoosuck, Pontiac, Patuxet, Peoria, Sassacus, Shamrock, Tacony, Tallahoosa, Tullahoma, Wyalusing, Wynooska, Algonquin, Chicopee, Chenango, Eutah.

They are all of 974 tuns burden, 240 feet long, 35 feet wide, and 12 feet deep, being all moved by side wheels. We regret to say that the hulls of those which have been built by contract are, as a general thing, miserable failures. A few weeks since the writer succeeded in knocking half the hatch off with a single kick of a strong boot; but this fault must be laid at the door of the contractors and of the officer who received them on the part of the Government; because the vessels built on the same plans by navy yard contractors are some of the finest specimens of naval architecture executed in this country. We believe the Shamrock, Mackinaw, Peoria, Algonquin, Tacony, Sassacus and others of the class built by naval constructors are capable of going to sea for any length of time in the roughest weather. The failures of the hulls of some of the vessels has nothing to do with their speed. Four or five of them have been tried, and as the same principle is carried out in the construction of all those to be completed, they will succeed as well as those which have been tried.

The Sassacus has made seventeen ordinary miles an hour, with the current against her, but in comparatively smooth water, and her engines were not working to their extreme force at all. Her commander feels confident that she can make in ordinary weather a like speed at any time. The Agawam was sent from Portsmouth, N. H., to chase the Alabama, and before she got into exceedingly rough water made eleven and twelve knots easily. The Eutah, which has been for some time at Washington, having experiments tried on board, has made thirteen knots, and the Osceola is equally successful. Several vessels which we have put down as not tried, have had their engines working alongside of the wharves; such as the Metacomet and others. The experiments with them, thus far, are highly successful, and show that there is not the least doubt of their making as good speed at sea as their predecessors.

It should be remembered that the incidents cited are pure unvarnished facts, substantiated by direct testimony from the vessels at all times. It is a source of extreme gratification to be enabled to show such a favorable record of our navy, particularly at a time when we are commencing the construction of two fleets of powerful vessels destined especially for speed. Twelve of these are being built at navy yards, and the others outside. If they should succeed in the trials of which we have been speaking, the United States may stand before the world patiently awaiting the advent of future Alabamas.

Moisture and Ventilation.

General Morin, who has much occupied himself with improvements in the ventilation of public buildings, in a note addressed to the Academy of Sciences, in Paris, treats of what he terms the "hygrometricity" of confined places. Much struck with the importance which the English engineers and authors attach to the imparting to the air employed for ventilation, whether heated or not, a certain amount of moisture, he was induced to investigate whether the salubrity of such air might not be due in some measure to the development of a certain amount of electricity by the passage of the air through the vaporized water (as is the case with regard to dew and rain during storms), giving rise to the production of free oxygen. He accordingly instituted some experiments, in order to ascertain whether the dispersion or solution of a certain quantity of sprayed water in the air sensibly modified its electrical condition. The results show the extrication of free oxygen acid.

OUR JOURNAL FOR 1864.

We have entered upon the New Year greatly encouraged by the liberal response made to our appeal, for the formation of clubs, and we trust that the good work will still go on vigorously. In return we pledge our best efforts to gratify and instruct our readers. We invite careful attention to the present number, and to the large amount of original matter which it contains. We also ask attention to the excellent engravings prepared by our own skillful artists.

Words of Cheer.

F. S. Pease, the well-known manufacturer of oil, Buffalo, N. Y., writes to us as follows:

No. 1, Vol. X. of the SCIENTIFIC AMERICAN came duly to hand.

I have taken your paper from the first number, and consider it the most valuable production published in this country; one which should be in the hands of every manufacturer, business man, railroad, mechanic and in every private family. It aims at facts clearly, logically and satisfactorily. Its suggestions in regard to new inventions are always well-timed and important. Through its columns every truly valuable invention is properly presented to the public.

I cannot urge its importance too strongly or endorse it too highly. I trust that in 1864 it will meet with the success it so richly deserves.

Letter from Captain Ericsson:

MESSRS. MUNN & CO.:—I return your plan and specification of the Improved Port Stopper, and in so doing I cannot refrain from expressing my appreciation of the skillful manner in which the invention has been described. In truth I am amazed at the thorough and intimate knowledge of the *whole* invention evinced in the specification.

Yours truly,
J. ERICSSON.

New York, Jan. 4, 1864.

From the Patentee of the famous Cow-Milker:

MESSRS. MUNN & CO.:—With your usual promptitude you call for the remainder of the Government Fee in my case (the New Cow-Milking Machine). The $20 you will please receive with my thanks. I believe this is the 6th patent I have secured through your Agency, which I would heartily recommend to all inventors, as the surest and quickest medium through which to secure the Government sanction to their rights.

I should say that I am now a reader of your paper, and certainly no young man that has any taste for mechanics can make a better investment than to become a subscriber for the SCIENTIFIC AMERICAN.

Very Respectfully yours,
L. O. COLVIN.

Philadelphia, Pa.

Cure for Corns.

A correspondent writing from Ohio, who has suffered much from corns, sends us the following, which he regards as an infallible cure, having tried it himself with complete success:—

Pare the corn as close as you can, then get a thin piece of india-rubber cloth, about the 20th of an inch thick) the pure india-rubber is the best, but that made of cotton will do), and where the corn is on one of the toes make a stall of it, or where it is on another part of the foot sew it on the inside of the stocking and large enough to cover the corn well. By continuing the application from four to six weeks and paring the corn as the callous skin loosens, the corn will disappear. The application of the rubber will give immediate relief to the pain. The principle of that cure is to assist nature in restoring the skin to its natural condition again.

How Glass Chimneys Were Invented.

Argand, the inventor of the famous lamp, which bears his name, had been experimenting for some time in trying to increase the light, but to no purpose. On a table before him lay the broken neck of an oil flask. This he took up carelessly and placed it, almost without thought, over the wick. A brilliant flame rewarded this act and the hint was not lost on the experimentalist, who proceeded to put his discovery into practical operation at once.

The *Sanitary Reporter* says that the Houses of Parliament, in London, have been for some years ventilated by means of moist air, produced by a spray jet. At the end of the delivery water-pipe is affixed a movable nozzle, perforated with minute holes. The force of the water in passing through the orifices causes the nozzle to revolve after the manner of the Catherine wheel used in fireworks, and the water is thus distributed throughout the surrounding atmosphere, producing a kind of mist.

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Improved Rotary Pump and Engine.

It is well known that great difficulty has been experienced in keeping the packing of rotary pumps and engines steam and water-tight. Many plans to attain perfection in this respect have been put in practice with more or less favorable results. The inventor of the improved mode of packing machines of the class mentioned, which is illustrated herewith, claims that his plan attains the desired end in a very perfect manner, and that while it is efficient in this respect, it also stands the wear and tear of daily operation for a long time. The engraving shows a perspective view (Fig. 1), of this pump, and also a section of it in Fig. 2, which will aid the reader to follow us in our description. The cylinder, A, is bored out true inside, and is fitted with two heads, B and C; in the space formed between these and the cylinder, the pistons, D, and a metallic disk, E, revolve. These pistons are fitted into slots in the metallic disk just mentioned, and have rollers, F, on them which run in a cam groove, G, cut in the heads, B and C. The pistons are also provided with a ball-shaped socket at their extremities, into which the joint, similarly formed, of the packing, H, is fitted. The abutment, I, at the bottom, is also packed in the same manner, with the exception that the packing is beveled off on each side, to allow the pistons to pass the same easily as they reach it; this abutment is always in close contact with the disk, E, and divides the cylinder into two parts; on each side of it are the outlet and inlet passages, J K, for the steam or water. These pistons and disk are all fastened securely to the shaft, L, and revolve when power is applied to it.

Fig. 1

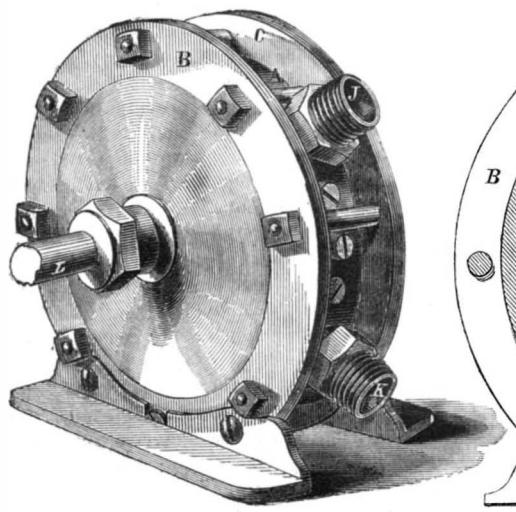
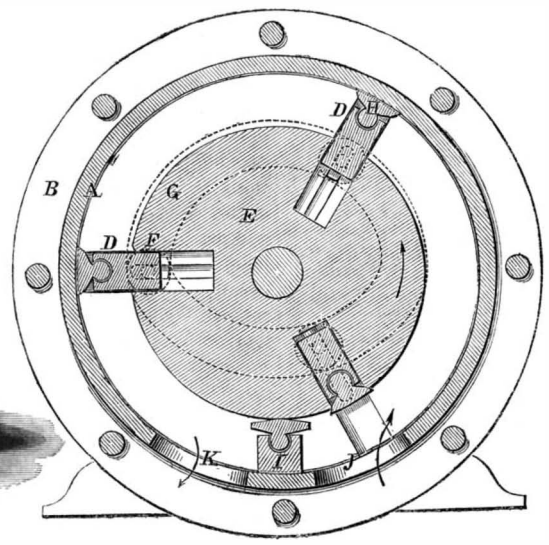


Fig. 2



ADANCOURT'S ROTARY PUMP AND ENGINE.

The operation of this pump is apparent to every one; as the shaft is revolved, the rollers on the pistons take the cam groove in the head and draw the pistons in when passing the partition or abutment. In their revolution a vacuum has been created, which causes the water to enter at one opening and be expelled at the other by the action of the pistons; the openings are shown in different positions in the section from that of the perspective view; but the plan and action of the pump remain the same in all respects. The pistons are always in close contact with the inner face of the cylinder, and are kept up to it by the pressure of the water itself, which, instead of tending to escape between the pistons and the periphery of the cylinders, presses on the lower side of the packing, and thus keeps a perfectly water and steam-tight joint.

A patent for this pump was granted Sept. 22, 1863, through the Scientific American Patent Agency, to C. L. Adancourt, of Troy, N. Y. For further information address the inventor at that place.

WARREN'S BEEHIVE AND HONEY BOX.

If the activity among inventors be any criterion to judge by, there would seem to be no lack in future years of that purest of sweets—honey: for much attention is being paid at present to the best form for hives. The swarm of bees that would not incontinently settle down and take possession of the comfortable hives which are so liberally provided for their accommodation all over the country, would show little wisdom. Very great improvements have been made in bee culture during the past ten years; whereas it was formerly thought sufficient to turn up almost any old box and trust to luck to get bees to fill it; now, scarcely any refinement in the construction of the hives is thought too great, and the insects are, in some hives, regularly kept through the winter uninjured by frost; they are also fed, for in the season mentioned their natural food is, of course, unattainable. All these improvements arise, unquestionably, from close observation of the habits of the busy little workers, and it is only by a careful and continued supervision, in this respect, that bee-keeping can be rendered both profitable and pleasant.

The hive illustrated herewith seems to be constructed on a very good plan, and has some peculiarities not embraced in hives which we have noticed heretofore. The inventor says:—This hive (see Figs. 1, 2 and 3), consists of a many-sided box, the alternate sides of which are constructed of wood, A, and glass, B, the glass being fastened to the frames with tin brads. A common barrel, with one head out, forms a cover, shades the glass, and regulates the temperature; two scolloped narrow boards are provided as a stand. The box turns on a pivot in the center, and has holes, C, in the bottom corresponding to similar holes in the top of the hive. By turning the box, the communication between the hive and box may be opened or closed. Our artist has rendered the construction of the hive so clear that letters of reference are scarcely needed. The hive is thoroughly ventila-

Fig. 1.

ted, the air entering underneath and passing out near the top of the hive and barrel. The ventilating holes, D, in the hive are defended with wire cloth, so that no insects or vermin can enter. The bees enter and leave the hive on an inclined board, through the center of the bottom of the hive, as at D'.

This hive is adapted to the natural shape of a swarm of bees; they cluster around the queen during cold weather, leaving the four corners of a square hive unoccupied. Moths operate in these corners, being kept alive by the warmth of the bees. This fact gave the idea of a round or many-sided hive as being the true shape adapted to the nature of the honey bee; especially as a defense against the moth. The hive affords great facilities for observing the operation of the bees, as the cover can be easily removed without disturbing them, when every part may be inspected with safety. During extreme heat, when bees in common hives cease work and cluster on the outside, the ventilation and dead-air space of this structure so modify the temperature that the bees continue at their labor unaffected by the heat, making more honey than usual during summer, and from the same peculiarity in the hive (that is, double walls), the bees winter well, and come out strong in spring. The beautiful finish of the honey deposited in the box of this hive, caused by the evenness of the temperature, has attracted much attention.

Honey made in these hives took the first premiums in the late Michigan and Illinois State Fairs. The honey can be taken from either hive or box with great facility, by turning back the tin brads—and any pane of glass can be quickly removed or replaced. The apparatus is easily managed. A new swarm, gently deposited near the entrance of the hive, with the cover on, will readily enter and commence to work immediately. Simplicity and cheapness of construction are also features of this hive. Any man who can use tools can make one; it costs but a trifle more than a common hive, with stand and box. This hive took the first premium at the Illinois State Fair, in 1863; and it has been used

Fig. 2

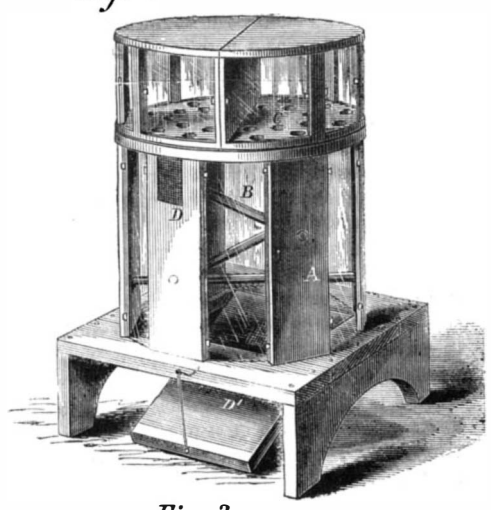
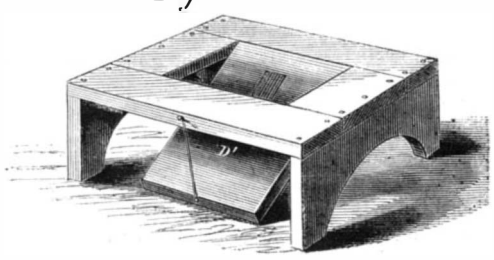


Fig. 3



the past two seasons with great success. A patent for it was obtained through the Scientific American Patent Agency, May 5, 1863. For further information address the patentee, Waters Warren, Three Oaks, Berrien Co., Mich.

THE COMMAND OF WORDS.—A statistician has had the patience to count the number of words employed by the most celebrated writers. The works of Corneille do not contain more than 7,000 different words, and those of Moliere 8,000. Shakespeare, the most fertile and varied of English authors, wrote all his tragedies and comedies with 15,000 words. Voltaire and Goethe employ 20,000; "Paradise Lost" only contains 8,000; and the Old Testament says all that it has to say with 5,642.

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ENERGY OF HEATED WATER.

Two theories once prevailed about the character of heat, and each has its advocates. Under one theory heat was held to be an imponderable fluid; under the other it was considered to be a mode of material action. The latter theory is now universally received. Heat may be converted into mechanical motion and mechanical motion will develop heat. By labored and subtile experiments heat has also been measured, and a unit has been adopted for it called "Joule's equivalent." It is now as generally recognised as the unit of work called a horse-power, which means 33,000 lbs. lifted one foot high in a minute. The unit of heat means that one degree of heat imparted to one pound of water, is equal to 772 pounds lifted one foot, and called a "foot-pound." Heat is considered equivalent to motive power and physical energy. Bodies possess physical energy in proportion to their specific heat. Thus a piece of steel containing a small amount of heat is a solid, but when the heat is greatly increased, the energy is exhibited in the power it possesses of reducing the steel to a fluid condition, when it may be molded into any form. Water also possesses physical energy in proportion to its heat, and when it is supplied with a sufficient quantity it exhibits its power in changing it from a fluid to an expansive vapor—steam. There is, therefore, more physical energy in a pound weight of the vapor than in the same quantity of heated water.

Professor Macquorne Rankine, LL.D., of Glasgow, has lately published a table setting forth the energy of water heated from 212° to 428° Fah. At the temperature of boiling water the energy is set down at zero, atmospheric pressure; at 320° of Fah. one pound of water is stated to possess an energy equal to 6,052 foot-pounds, and a velocity of 624 feet per second; at 428° Fah. it has an energy of 22,156 lbs., and a velocity of 1,194 feet per second. That is, the amount of energy in a pound of water heated to 428°, will give a projectile weighing one pound such a velocity.

In allusion to this energy of heated water, Prof. Rankine says, "It is worthy of remark that the energy depends solely on the specific heat of the substance in the liquid state, and the initial and final temperatures, and not on any other physical property of the substance." He does not mean to convey the idea that by heating one pound of water to 428° Fah., for example, in a gun loaded with a pound shot, that the ball will be projected 22,156 feet—over four miles—with a velocity of 1,196 feet per second, and yet from the brevity of his statements such an impression is conveyed. Motive power, or mechanical work, is based upon the physical properties of substances, as well as their specific heat. An agent possessing the physical properties of gas, or a liquid, like water, capable of conversion into an expansive vapor, must be selected for the purpose of transferring the energy of heat economically to drive machinery. Molten steel might be heated to 10,000°, yet it could not be employed to drive a piston or discharge a projectile from a gun. It is the steam, not the boiling water in a steam boiler, that moves the piston of the engine and drives the machinery.

DERANGEMENT OF STEAM ENGINES.

In a large steamship, when the engines are being placed on board, there are so many irresponsible persons about, so many different trades at work, (on the same detail, perhaps), that it is a matter for wonder that accidents do not occur to the engines oftener. We have many times noticed oakum plugs, shreds of canvas, etc., stuffed into valves and cocks, to keep dirt and chips out; and we have also seen these preventives drawn in, or purposely thrust down, by mischievous individuals, so that when the cock was opened they would effectually choke the pipe. To our thinking, it is better to avoid the chance of disaster in this respect, by making a plug, say 6 inches long, and driving it in firmly; then there will be no possibility of damage. The boilers of a new steamer are usually the receptacle of every conceivable sort of rubbish. No one who has not actually seen the contents of one can form any idea of the matter that is collected in them. Old shoes, that the boiler-makers carry in to throw at each other, keg-staves by the wheelbarrow load, the refuse of the rivet kegs the men sit on while at work, hoops from the same, old lamps by the quantity, red lead, washers, nuts, bolts, rivets, chisels, hammers, spun yarn, and filth unnameable, form some portion of the miscellaneous contents of a new steam boiler in a large ocean vessel. It is no wonder then that they foam when first started; all this refuse has to be cleaned out as best it may, and much of it is never removed. When cold water pressure is applied to steam boilers, they being filled full to the safety valve, it is very possible that some of these sticks or staves may be carried into the stop-valves, and remain there, to be at some time drawn into the steam pipe, and from thence to the engine. This was not the cause of the disaster to the *Re d' Italia*, but there is certainly danger that before the worthless litter gets so water-logged as to lose its specific gravity, it may do some damage. A good plan to avoid danger from the cause mentioned, would be to let cold water into the boilers a few inches over the flues, and before they are fired up have some trustworthy man go in and clear out all the foreign matter he may find; he might not discover anything, and possibly sticks by the armful might be found: at any rate no harm could ensue, but much benefit might result from the observance of this plan. We have seen bolts and chisels taken out of steam boilers that were covered with scale, having been in them ever since the boilers were made, and know also of one instance at least, where a new engine when it was to be started, utterly refused to move an inch. On the bonnet being removed from the steam chest, a chipping hammer was found jammed between the valve and chest, probably carelessly left in after the valve was set.

Every new engine should be thoroughly inspected before it is tried in actual work, to see that nothing is out of the way; and although we do not doubt but this was done on the Italian frigate, the accident proves that it is safer to err on the side of prudence than the reverse. The engine of the *Re d' Italia* became disabled, from the fact that the "pocket" in which the valve stem nut is fitted, pulled out, and the broken pieces falling down into the port were blown into the cylinder by the steam entering subsequently. The piston was much injured, and it is thought a new one will have to be supplied.

Mechanics' Club-Houses—A Good Thing.

The London *Engineer* states that Messrs. Watkins and Keen, of the London Works, Smethwick, have set an admirable example to large manufacturing companies, by providing a commodious club-house for their employees. It was built for and formally given over to the charge of the operatives as their institution. It contains a large and elegant dining-room, a reading room, a library of 2,500 volumes, and it is well furnished. The operatives can use these rooms at their pleasure, but must abstain from smoking and drinking in them.

SPEED OF CUTTING TOOLS.

In making estimates for steam or other machinery, it is important to know the time required to execute certain portions of the work. This can only be accurately arrived at by a knowledge of the speeds at which cutting tools work, for mere manual dexterity cannot always be counted on for the speedy accomplishment of a job. Where of old hammers clinked incessantly on chisel heads, and a mighty force of "chippers and filers" were busy in hewing out a cross-head or crosstail from the rough shape in which it left the forge, a sturdy tool now cleaves its way through the tough metal, reeking with steam and bent on accomplishing its purpose, no matter how heavy the cut.

The speed of cutting tools which is employed in the largest shops and by the most enterprising builders of machinery, also affords a standard of comparison for others desirous of excelling; and much good may be accomplished by recording the results of our observations on this subject; in this article none but metal-working cutters are considered. There are some generic difficulties in the way of arriving at positive statements concerning the rates at. which cutters should travel, or the metal which is worked should pass under them, as it does in some cases; nevertheless it is sufficient to notice the speeds generally employed and leave particular cases to take care of themselves.

In running lathes, the kind of iron, the nature of the work, the stage of the work, whether finished or merely roughed out, the texture of the metal, and the kind, whether steel, brass, cast or wrought-iron, deserves attention; for without such consideration statements are worth no more than mere speculation and tend to confusion. Wrought-iron and cast-iron in small sizes, where both metals are of good quality, sound and even, free from sand streaks in the first, and flaws and blow holes, in the second, may be run at nearly equal speeds with economy (that is for all pieces under one inch and a quarter diameter or thereabouts); as the diameter increases, however, this is no longer the fact, and cast-iron must run slower or the tool and work will be destroyed. In shafts of 3½ inches diameter, a circumferential speed of the work equal to 220 inches per minute, or twenty turns with a lateral feed of one-thirty-second part of an inch, reducing the work three-eighths of an inch, is a good speed for short lengths, and one that cannot probably be exceeded with economy. Of course, in taking a cut of three-sixteenths of an inch, the work would be roughed out, and the labor on the tool much greater than with small cuts and finer feed. A great deal of misapprehension is manifested on the subject of feed, many persons supposing that one-thirty-second of an inch produces a chip of that thickness; this is not the case; the cut is much thicker than the feed employed and no comparison can be formed from the thickness of the chip what the actual feed or depth of the cut was at each revolution. This is on account of the corrugation or upsetting of the metal as it is taken off the work by the tool, thus adding to its size. At the rate above spoken of, the tool, in turning a shaft 3½ inches in diameter, travels over a circumferential surface of 13 feet 3 inches, supposing the feed to be thrown out of gear; each revolution of the shaft advances the tool the thirty-second part of an inch; therefore a cylinder twenty-thirty-seconds or five-eighths of an inch long by 3½ inches diameter, is traveled by the tool in doing its work; the convex surface of such a cylinder is about 13 feet 6 inches.

At this speed the tool, when properly dressed, ground and tempered, works economically; taking a good cut, retaining its edge without too frequent grinding, and making smooth work. In turning wrought-iron shafts as large as 12 inches and 18 inches diameter, four and a-half to six revolutions per minute, with a feed corresponding, is a "good to fair" speed, which probably could not be increased without incurring loss of time in dressing and grinding tools. This would give a circumferential velocity of about 19 feet per minute for the 12-inch shaft—6 feet more per minute than cast-iron work should be driven. Wrought-iron will bear to run quicker than cast-iron, chiefly because it is freer and softer to cut than cast-iron as a general thing, and also for the reason that the tool is generally kept cool by a stream of water, which it is not convenient or necessary to use on cast-iron.

Some planers that we timed in different shops run as follows:—A thirteen-foot bed with a moderately

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good roughing feed, cuts 15 feet per minute; it must be borne in mind, however, that planing machines have to work all kinds of metal on the same speed. This has always been a cause for wonder with us; why not put one pulley on a lathe and drive that at one speed for large and small work? A planer has exactly the same duty to do in reality as a lathe, the increasing or decreasing diameter of the work in the lathe being fully compensated for by long and short jobs on the planer. Of course a change of speed is not required in extra large tools where the work is always heavy; but for planing machines with beds 12 feet long, there is no reason why there should not be two speeds provided on the counter shaft overhead which drives the back-and-forth motion belts. It would be just as appropriate to have only one feed for all work, as only one speed for all kinds of jobs. While a planer with a bed 12 feet long is able to run at the rate of 15 feet per minute, a 25-foot bed planer is driven at 13 feet per minute, or a little less than the first-mentioned tool of this class, because heavier work is done upon it. A shaper, or quick-working planing machine for short jobs, has the change of speed we speak of, and at the slowest speed, with a seven-inch stroke, also runs at the rate of 12 feet per minute. It will therefore be seen, from the examples mentioned previously in this article, that the average speed at which cutting tools work is, on work of an ordinarily heavy class and of a standard kind, about 13 feet per minute for cast-iron, and 15 feet per minute for wrought-iron. Brass we have not considered at all; but with free-working yellow brass, 25 feet per minute is not an unusual speed for diameters of ten inches. The speed ot brass work, however, is a very difficult thing to fix, for while a large brass ring may run at a rapid rate and turn economically, a shaft of the same size could not be run at half the speed the ring does and work well on the tool. Besides this brass is such a "fickle" metal, so to speak, being at one time hard and another soft, now free from "blow-holes" and again honey-combed with them, each and all phases requiring different speeds to suit circumstances: for these reasons we say we have omitted any discussion of the speeds proper to cut brass. And it must be also borne in mind that the rates mentioned as proper for cutting cast and wrought-iron vary greatly at times. Of course chilled iron cannot be turned on speed that would be proper for a soft loam or a green sand casting; neither can a scrap-iron shaft be run economically at the same rate as a rolled one of similar size. But as a standard rule for ordinary work, 13 feet per minute for cast-iron, turned in lathes, 15 feet for turned wrought-iron, and 15 feet for planers, alike on all metals, is a fair estimate. It is very possible that our readers may have some experience which conflicts with these statements: if so we would be pleased to hear from them.

THE DYES OBTAINED FROM COAL TAR.

The colors derived from coal tar have now become important manufactures. But so far as we have been able to ascertain upon enquiry, all those used hitherto in our country have been imported. From an advertisement dated Huddersfield, England, (and published in the last number of the Scientific American) in relation to the manufacture of such dyes, we conclude that they have come into general use in Europe and that they will be employed permanently in the arts, unless superseded by some more brilliant and less costly products. In view of these considerations we would direct the attention of practical chemists to these subjects, believing that the manufacture of such dyes would form a new and profitable branch of national industry. A brief description of the manufacture of such colors will, therefore, be of general interest.

One of the products of distilled coal tar is naphtha, from which another product, called benzole, is obtained by distillation. Benzole is regarded as the hydride of phenyl, an organic radical. It combines with nitric acid (aquafortis) and forms nitrate of benzole, which has a fragrant odor. From this product, aniline—the base of the colors—is manufactured. There are several modes of manufacturing aniline, the object being to make hydrogen at the moment of its liberation—nascent state—unite with the nitrate of benzole. One mode is with the sulphide of ammonium. This consists in saturating an alcoholic solution of nitro-benzole, first with ammoniacal gas and afterward with sulphuretted hydrogen. The liquor is now allowed to remain for twenty-four hours and then heated, when some sulphur will be found to have separated. On decanting from these crystals, the liquor must again be treated with sulphuretted hydrogen and again distilled or heated. This process must be continued, if need be, re-saturating with the gas until a heavy oily matter deposits: this is the aniline, which requires to be separated from the accompanying fluid and distilled by itself. When so treated it is obtained nearly pure.

Another and simpler mode, called Beschamp's process, consists in using acetic acid and iron filings, as follows: One part of nitro-benzole, one part of concentrated acetic acid, and two parts by weight of iron filings (or zinc) are mixed cold in a capacious retort. After a few minutes vapors begin to arise, consisting of aniline, acetate of aniline, and some unaltered nitro-benzole. These are condensed and distilled twice in a retort, when the aniline separates as an oily-looking substance, consisting of $C_{12} H_7 N$. When pure it is colorless, has an aromatic odor and is soluble in alcohol and ether. It is very volatile, nevertheless its boiling point is 360° Fah. It is a powerful base, and combines with acids to form salts, which are in general soluble; and thus the beautiful dyes—mauve, magenta, fuschine, azeleine, &c., are now manufactured.

Mauve—a purple—is prepared as follows: A cold solution of aniline in sulphuric acid is mixed with a cold solution of the bichromate of potash, and stirred. A black precipitate gradually falls to the bottom of the vessel in which the mixture is made, which gives the coloring matter in an impure state. This is collected, washed, dried and then digested in naphtha, which dissolves some tarry matter in the product. The residue, which is insoluble in naphtha, is dissolved in alcohol, then distilled, when the spirit is driven off and the remainder is pure mauve. The way to dye a purple or lilac with this substance, is as follows: The crystals of mauve are dissolved in alcohol, and to the quantity intended for the dye a boiling hot solution of tartaric or oxalic acid is added; the mixture is then cooled, the article to be dyed is immersed and handled until the desired depth of color is obtained. These products dye woolen and silk goods, without mordants. To vary the shade of this color, a small quantity of hydrochloric acid gives it a deep violet tint, and a still larger quantity of the acid forms a blue color.

There is a very rapid way by means of which the production of this blue dye can be shown: Take a solution of aniline in hydrochloric acid, containing excess of acid; to this add solution of chloride of sodium, when the color will be formed immediately; when the desired tint has been obtained, pour in solution of carbonate of potash, which will neutralise the free acid and precipitate the mauve. If the alkaline carbonate were not added, the consequence would be that free chlorine would be disengaged and the color bleached.

The color *fuschine* is very beautiful, and is prepared as follows:—Dry aniline is raised to its boiling point; when in this state, powdered chloride of mercury (corrosive sublimate) is added in small portions at a time, the liquid first becomes brown, but very soon a rich violet-red color appears: this is the dye. Water is now added, and the whole heated to ebullition. It is then allowed to rest a moment for some insoluble matters to subside, and filtered while hot. The filtered liquor contains the coloring matter dissolved. To separate it, advantage is taken of its being insoluble in a saline solution; accordingly, chloride of sodium in a solid state is added to the liquor, and as the salt dissolves, the dye is precipitated. Fuschine may be employed for dyeing, either in aqueous solution without a mordant, or with the ordinary saline or acid mordants. With the exception of the mineral acids, which alter the color, magenta and fuschine are identical substances, under different names.

Azeleine is a splendid red color, and is difficult to make. It is prepared as follows:—Ten parts of aniline are heated on a water bath up to 260° Fah.: when this temperature is reached, seven parts of nitrate of mercury, dry and in powder, are dropped in by degrees. It must remain at 260° for eight or nine hours, when the mass will be found to have changed to a beautiful red color. This only requires to be dissolved in alcohol and water, and used for dyeing.

When ribbons have been dyed with these and other colors, a beautiful gloss is imparted to them by the application of albumen in the form of white of egg. Recently these purple and red dyes have been used as inks, but they are not so permanent as those obtained from carmine. In dyeing wool with these colors, the temperature of the bath should not exceed 160° Fah., and the liquid should be a dilute aqueous solution of the coloring matter. A very small quantity of acid may be added as an "alterant," but if not required to produce certain shades, it should not be used. Azuline blue is more difficult to manage in dyeing silk, but it is a more beautiful color than that derived from indigo and the ferro-cyanide of iron—called "Prussian blue." Hitherto red, purple, blue and lilac colors only have been more commonly produced from these coal-tar products; but from the efforts now being made in Europe by practical chemists to obtain other colors, we doubt not but greens, drabs, and all shades of brown will yet be dyed with them, as they seem to be effecting a complete revolution in the art of dyeing.

BRITISH IRON AND IRON MAKERS.

We learn from our able cotemporaries, the *Engineer* and *Mechanics Magazine*, that the British iron trade has been very prosperous during the past year. Almost the same condition of affairs has prevailed in England as in the United States, with regard to the scarcity of skilled workmen, to meet the great demand for iron and manufactured articles of iron. Great strikes have taken place among many of the trades, and in most cases there has been an advance in workmens' wages. The most extensive and long-continued strike ever known among iron puddlers, resulted in the operatives gaining their object. Of course there has been a great rise in the price of cast and bar iron, steel, and all articles made of iron; but the demand for those under advanced prices has not diminished. We learn from the *Engineer* that orders from America cannot be supplied fast enough. One agent in New York of a South Staffordshire firm, states that if he had 10,000 tuns of finished iron he could soon dispose of it. Another rise of about thirty shillings sterling per tun, on bar iron, it is stated, will soon take place, and pig iron will rise about ten shillings per tun. The price of coal there has nearly doubled, having advanced from five shillings and six pence (only about one and a quarter dollars), per tun, to eight shillings and six pence, yet a sufficient supply of coal cannot be obtained to meet the demand. The iron manufacturers state that this prosperous trade is not caused by sudden excitement, or speculation, but is healthy and has a sound foundation. Iron has lately taken the place of other materials for so many purposes in civil engineering, naval architecture, etc., that the demand for it hereafter will be far more extensive.

With respect to the prices of British metals, Welsh bar iron is selling in London at from £7 15s. to £8 per tun, and Welsh rails at £7 per tun; Staffordsbire bars at £12 per tun; nail rods at £8 15s.; sheet iron is £11 10s. per tun; Scottish pig iron is £3 5s. per tun; scrap iron bars, £9 10s.; and rails, £8. English tin is £112 per tun; charcoal tin plate, £1 7s. per box; lead, £20 10s. per tun; spelter, £19; copper in cake and tile, £98; in sheet, £105 per tun. These are the latest ruling prices received. £1 sterling rates at about £4.85 in specie. The prices of foreign metals in New York vary with the rates of exchange.

Sorghum Molasses.—The five principal States of the West for the production of sorghum molasses are Missouri, Iowa, Illinois, Indiana and Ohio. Their estimated production, last year, was 10,203,728 gallons. This year only 6,970,882 gallons—a decrease of nearly three and a quarter millions of gallons. The amount of ground planted was much greater than in 1862, but the frost destroyed the yield. The annual consumption of molasses and sugar prior to the war was about 45,000,000 gallons of molasses and about 1,000,000,000 pounds of sugar, the amount per each inhabitant, slaves excluded, being 39 pounds. The increase of the consumption of sugar in the United States since 1840 was 227 per cent, whilst the increase of population was 63 per cent. The Louisiana cane sugar, this year, will not, it is supposed, exceed 30,000 to 50,000 hogsheads, and hence the country must rely on heavy importations to supply its wants.

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OVERBURDENED SHIPS OF WAR.

It is extraordinary, in view of the demand for fast ships in the navy, that those which possess speed and are already in commission, are not made the most of. These remarks are stimulated by the fact that the steam frigate *Niagara* is now at the navy yard discharging her immense armament. This extraordinary battery consists of no less than twenty-two 11-inch guns, weighing at least fourteen tuns each, and ten or twelve Parrott 200-pounders ; with this load on board and supplies of shot and shell for the same, the vessel went on a cruise, but was, of course, unfitted to remain at sea, and was obliged to return. The *Niagara* has made by the log 8½ knots per hour on an average and occasionally much better time ; from 9 to 11 knots, and then her draft of water, with all stores on board, except her battery and ammunition, was 22 feet. It is said that she draws much more than that now and her speed is correspondingly diminished.

It is a matter for wonder to discover what such an enormous battery is intended for on a ship of the *Niagara's* capacity. Other ships do not require half the weight of metal and yet do good service. There is no question but the *Niagara* would be much more efficient as a cruiser, with three or four rifles, or one rifle, and three 11-inch guns, than with her present encumbrance. The space now occupied by ordnance might be profitably used for stores, and the ship could keep the sea at least as well as the *Alabama*, or *Vanderbilt*. The pirates, however, are employed in distant seas, so of course there is just now no use for swift and well-armed cruisers. When they return and burns a few more of our merchantmen, there will doubtless be a loud call for fast ships again. Mrs. Betsey Trotwood, in "David Copperfield," had a great horror of donkeys, and whenever they appeared on her green, rushed out with her maid, crying "donkeys! Janet, donkeys!" and forthwith drove them off. When the Jeff. Davis pirates infest our coast again, there will be a few fierce sallies, fast ships will go in every direction but the right one, the pirates will attain their ends, be frightened and run away, and the donkeys will have been driven off. Better go and catch the brutes at once, if it is possible ; if not, contract the job out to some enterprising merchants and they will soon render a good account of the pirates.

COAL TAR AS A PRESERVATIVE AGENT.

According to the experiments of M. Kuhlman, accounts of which have been communicated to the Academy of Sciences, France, coal tar seems to possess wonderful preservative powers, in preventing many materials from decay when exposed to the weather. He states that with the pitch derived from the distillation of coal tar, bricks simply dried in the open air and not burned, as also plaster casts when boiled in it, become proof against the weather. The pitch of coal tar is put into a cast-iron cauldron and the articles or materials boiled in it for about an hour. When taken out and dried they become very hard and impermeable to moisture. The oxides of iron obtained by the combustion of iron pyrites when mixed with the pitch of tar, form a paste which may be moistened into any form ; articles thus produced, when dry, become exceedingly hard and durable.

The employment of the pitch of coal tar has become very common in the towns of the North of France, to protect basements of houses from the effects of external damp; but of course this cannot prevent the damp rising from the ground through the interior of the walls. To effect this object in damp situations, the layers of brick or stone for cellar walls, when being erected, should be treated with this pitch. In New York the walls of the basements of many buildings erected along the streets fronting the rivers, where they are subjected to back water during high tides, have been protected from damp by asphalt. The bricks are dipped into boiling asphalt, laid up in three courses and become impermeable to moisture; this is an old and effectual method practiced by the ancients for preserving walls from damp. M. Kuhlman, who has a large chemical establishment, states that he applies coal tar pitch, while hot, to all the exterior walls of his ovens, for decomposing salts, burning pyrites, concentrating sulphuric acid, &c. The tiles which he employs for covering the roofs of his buildings are also impregnated with the tar by being boiled in it, and they are thus effectually preserved from the action of acid vapors. In England, in soda manufactories, where hydrochloric acid is generally condensed in towers containing coke, constantly kept wet by a stream of water, the flagging of the base of these towers is immersed in tar before it is laid down. M. Kuhlman recommends the application of this tar to all marine structures—such as walls exposed to the sea. He also mentions a case of peculiar interest to chemists. He boiled plaster casts in the tar pitch heated to 600° Fah., and found that the water of hydration in the plaster escaped at about 248° Fah.; but the expulsion of this water of hydration did not alter the form of the crystals of the sulphate of lime; there was a molecular substitution simply; the crystals of the sulphate of lime were transformed into a black shining mass, having the same crystalline form in which the water of their crystallization was substituted by tar. It was a singular instance of pseudomorphism, very interesting in a scientific point of view. Stearic acid and oils produce similar results upon plaster casts boiled therein. Respecting this phenomenon Kuhlman says:—

> The substitution of tar for the water of hydration in moulded plaster, in gypseous plaster, and in isolated crystals of the sulphate of lime, will fix the attention of geologists and crystallographers; and it is not impossible that a deeper study of this phenomenon may lead to new observations, that may throw some light upon the transformations to be met with in the history of the globe.

From the experiments of this distinguished chemist we learn that casts of molded plaster and sculptured alabaster, otherwise incapable of exposure to the weather, may be so treated as to become impervious to moisture, unaffected by frost, and may be used for the outside ornamental works of buildings. In submitting molded articles to the action of the tar pitch, they should be introduced when the tar is comparatively cold, and the temperature should be gradually raised, otherwise they will be liable to crack and split if the heat is applied too suddenly.

IRON-CLAD SHIPS—PERFORMANCE OF THE "RE D'ITALIA."

In view of the interest which now attaches to the respective merits of iron-clad vessels of war, the seagoing class with lofty sides and those with partially submerged hulls, the performance of the *Re d'Italia*, one of the former class, on her trial trip, will prove interesting.

The trial trip of this vessel, built by Mr. W. H. Webb, of this city, has demonstrated some very important facts in reference to the construction of iron-cased broadside ships. The English and French have signally failed, thus far, in their attempts to build iron-plated vessels which can keep the sea in a gale of wind without imminent danger of foundering. In our opinion Mr. Webb's ship possesses many advantages over other vessels of her class ; she has certainly proved herself a magnificent sea boat. As regards speed she can make over 12 knots per hour, working her screw up to 50 revolutions per minute. The *Re d'Italia* encountered a strong S. E. gale, which lasted for nearly twenty-four hours. The wind blew a fresh double-reefed topsail breeze, with occasional heavy squalls. She was steered so that she had the sea, which was at times quite heavy, abeam on the quarter astern, and also dead ahead. With the sea abeam, and under her fore and aft canvass, she rolled easily, and by no means as deep as those on board expected. On reaching her bearings and righting there was no unpleasant, or in fact any perceptible start ; she came up handsomely, continuing this motion with such ease that at no time were racks used on the cabin table. With the sea aft and on the quarter, she rose and fell quite charmingly ; in fact she was so regular in her motion that her battery could have been cast loose and worked with safety at any time. The ship was then put head to sea, to ascertain if she pitched easily. In this motion she proved herself more graceful than ever. When her head went down, it moved steadily, and instead of forging ahead rapidly, forcing her bows into the waves, she held back and rose without having wet her bob-stay bolts.

To say that she steers well, but faintly conveys the idea of the perfect control by the helm. Two men can steer her with ease, and keep her on a straight course. As for her strength we have nothing to say, but simply state that, after going ashore on the Jersey beach, she lay for twenty-four hours in a hard pan of sand, and although she thumped some when she was taken off, not the slightest damage was perceptible, the putty in her seams was not broken or started, and she did not make a drop of water. We have seen midship sections of the *Warrior*, *La Gloire* and *Dictator*, and we are constrained to believe that the *Re d'Italia* eclipses them all, and has the best lines for stability for a sea-going iron-clad yet built. We shall look for a good report of the ship when she goes into the hands of the Italian government, and hope that all her good qualities will be made the most of.

PACKING STEAM PISTONS.

Economy in fuel, saving in repairs, in short, increased duty generally, results from well-packed steam pistons. Erroneous views respecting the performance of this duty prevail among engineers; it is thought necessary to use great force to insert the springs; the springs themselves have set screws in them, they are tremendously thick and heavy, entirely disproportionate to the work, and, in most cases, not what they should be. The surface of a steam cylinder is one of the most critical or nice points of the engine; when it is once ruined heavy expenses are incurred in renewing it; and since it can only be injured by gross carelessness, it behooves every engineer at all anxious for his reputation to be sure that he does not omit any portion of his duty toward it.

When the piston has been removed from the cylinder from any cause, the utmost caution should be observed in replacing it. Not only should the rings themselves be chalked before the follower is removed, so that they may occupy the same place in the cylinder, but every minute speck of dust and the little concreted balls of tallow and sediment, which collect like shot in the inside of the piston, should be taken out and the scale scraped off. Sometimes the heat and tallow combined causes a thick heavy deposit to appear on all parts inside the follower; all this matter should be removed and the piston rendered as clean as it came from the shop, if possible. When the rings are inserted they should be wiped with something clean and soft, so that there can be no possibility of dirt or grit adhering to them. The piston should be put in its place, and, if it belongs to a horizontal engine, the rod packed; in a vertical cylinder this is not possible. When the piston is carefully centered by means of inside calipers, the rings should be pushed in by hand, and the springs (properly "set") driven in with a tap of the hammer handle. In horizontal engines the weight of the piston must be compensated for by extra strong springs or blocks of wood; but if the cylinder is true and has been well taken care of, the springs correct in proportion and the rings of a proper thickness, the piston will be perfectly steam-tight and easy working with the packing set out as described. An immense pressure is exerted on the interior of the cylinder by stout springs and friction is generated to an alarming degree.

Let any engineer take one of the springs usually employed in horizontal engines and place weights on it, and see how much it requires to deflect the center one-sixteenth of an inch; he will then have some new ideas about the friction of the packing in an improperly-packed cylinder. The barbarism and absurdity of using set screws in packing is too manifest to call for criticism; such devices are not springs, they are small jack screws, and have no more elasticity than a solid block of iron. We once saw an ignorant engineer take an oak stave, as heavy as a stick of cord-wood, and batter on the end of the piston so as to drive it, the packing and springs (which he had previously inserted on a floor to save time), into the cylinder; it is not necessary to remind sensible men that such a course as this is simply that of a blockhead. The packing of a steam piston should be examined once a month, at least, to see that the springs have not set or relaxed, and that every thing works well; if the rings are too slack edgeways the follower must be "skinned" over in a lathe, so as to bring the surface of it and the packing in contact again. Much care should be taken that the follower does not bind the rings tightly. When the bolts in it are screwed up hard, the rings should be so fitted that they will slide in and out with a strong pressure of the hand; then the packing will perform its functions properly. Much more space might be devoted to this subject than we have at our disposal at present, and we may recur to it at an early day.

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The French Metric System.

The metric system is the system of measures, weights, and coins which was some years ago adopted in France, and has been gradually making its way among many other continental nations. It is founded upon a measure of length. This standard of length is the meter, which is a ten-millionth part of the meridian of the earth. The length of the complete meridian was deduced from an accurate measurement of a part of a meridian between Dunkirk and Barcelona; the unit of this length is about 39⅓ inches. All linear measures larger than this proceed by steps of 10, and the names are derived from the Greek prefixes, *deca-*, *hecto-*, *kilo-*, so that the terms decameter, hectometer, kilometer, indicate respectively 10, 100, 1,000 meters, but all subdivisions of the meter descending ten-fold every step, are indicated by the Latin prefixes, *deci-*, *centi-*, *milli-*; so that the words decimeter, centimeter, millimeter, indicate respectively one-tenth, one-hundredth, and one-thousandth of a meter. It is plain that any given length expressed in meters can be immediately reduced to the multiples or higher denominations by dividing by 10, 100, 1,000; or can be reduced to the lower denominations or submultiples by multiplying by 10, 100, 1,000; and since the decimal point in any number, as 375,-862 meters separates the whole numbers to the left from the decimal or fractional part to the right, the mere moving of this point to the right one, two or three places will be equivalent to multiplying it by 10, 100, 1,000—that is, reducing it to decimeters, centimeters, and millimeters, and the moving it tothe left, one, two or three places is equivalent to dividing it by 10, 100, 1,000—that is, converting it into decameters, hectometers and kilometers. Hence there is no other reduction whatever but the simple moving of a decimal point.

From the linear measures are deduced the measures of surface. The unit of superficial measure is the square of the decameter or length of ten meters, and is called the arc. This derives its greatest importance from its being employed in the measurement of land. Only one multiple and one submultiple of the arc are employed, namely, the hectarc and centiarc; the hectarc is about equal to 1½ acres. Measures of capacity are for solids and liquids; the unit of this is the *liter*, which is the cube of the decimeter or tenth of a meter, but for convenience it is generally reduced to cylindrical form. Its multiples and submultiples are also named from the Greek and Latin prefixes; the liter is equivalent to about 2⅛ wine pints. With respect to weights, the unit is the gram, and is the weight of the volume of water contained in the cube of a centimeter, when the water is at its greatest density. All other weights are derived from it, as has been shown in the case of the meter and liter, by the employment of Greek and Latin prefixes. The gram is used for weighing light and small substances, as a medical dose, or a letter, and is nearly 16 grains troy; the kilogram is used for heavier substances, and is equivalent to about 2⅛ pounds troy. The coins are of but two classes—centimes and francs. The latter is the unit or standard, and consists of five grams of standard silver, with a small portion of copper alloy. The centime is a small copper coin, whose diameter is a centimeter, and weight a grain; so that one hundred centimes placed in a row would give the length of a meter; or used as a weight they would give a hectogram, or tenth of a kilogram. Hence every centime forms at the same time a coin, a measure, and a weight.

How to Grow Peaches Every Year.

The following, by a correspondent of the *Ohio Cultivator*, is worthy a trial by alllovers of delicious fruit: Procure your trees grafted upon the wild plum stock. The tree partakes of the nature of the plum, being hardy, and will never winter kill, and putting out late in the spring, will never be injured by the frost. It is a certain preventative against the workings of the peach grub, while the natural lifetime of the tree is beyond that of our own; so you may depend upon peaches every year, and for a long period of time, without the destructive and discouraging influences attending the growth of the common peach. They can be obtained at from fifty to seventy-five cents per tree, and you had better pay five times the amount than not to obtain them, being certain of peaches very year. Try it, and our word for it, you will be satisfied with the result.

IMPORTANT DECISION AFFECTING THE RIGHTS OF JOINT OWNERS OF PATENTS.

GEORGE H. VOSE AND ANOTHER *vs.* ISAAC M. SINGER AND ANOTHER:—Supreme Court of Massachusetts—

CONTRACT, with a prayer for relief in equity, and that the defendants may be decreed to account with the plaintiffs and pay over to them such sums as may be found to be justly due.

The following facts were agreed to in this court: On the 29th of March, 1852, the defendants, being the owners of the patent right referred to therein, executed to the plaintiffs, jointly with William R. Perkins, an assignment; the plaintiffs, as partners,, purchasing and holding one undivided half part, and Perkins purchasing the other undivided half part, of the interest and right therein conveyed. On the 10th of December, 1852, Perkins, assigned his undivided half part to C. G. Andrews, whose administratrix, on the 5th of February, 1855, assigned the same to the defendants. Between said 5th of February and the 18th of March, 1857, (when the plaintiff's right terminated), the parties to this suit owned respectively one undivided half part of the rights under the assignment, and both sold machines containing the patented invention in the assigned territory, for use therein; and the defendants sold such machines, to the number of seventeen, more than were sold by the plaintiffs, for which they received their pay, making large profits thereon, but they refused to account with the plaintiffs therefor, though often requested so to do. Before February 5, 1855, the owners of the interest under the assignment had been accustomed to sell and account together for all sales and profits.

No question was made as to the form of action. Counsel for the plaintiffs alleges that the general rule is, that part owners and tenants in common are liable to contribution to each other. *Shepard vs. Richards*, 2 Gray, 424. *Dickinson vs. Williams*, 11 Cush, 158. *Munroe vs. Luke*, 1 Met. 463. *Sargent vs. Parsons*, 12 Mass, 149. *Gowen vs. Shaw*, 40 Maine, 56. *Albee vs. Fairbanks*, 10 Verm. 314. There is nothing peculiar in the kind of property owned by these parties, or in the manner of raising income or profits from it, to except this case from the general rule. It was held by virtue of the same title. This excludes either party from holding or employing it independently of the other. Selling machines within the assigned territory is not merely using the common property. Each machine sold diminishes the common property, unless the profits are held for the benefit of both parties. In this case, profits were actually received by the defendants.

OPINION BY JUDGE CHAPMAN.

There is not in this country any limitation of the number of persons who may be joint owners of a patent right. In England it is otherwise. English letters-patent contain a provision that if they shall at any time be vested in more than *twelve* persons or partners, they shall become void. But the statute of the U. S. of 1863, *c.* 357 § 11, makes patents assignable, either as to the whole interest, or any undivided part thereof, by any instrument in writing; and licenses may also be granted by the patentees or their assignees to as many parties as they please. Many proprietors of patents have availed themselves of the right to make assignments and grant licenses, to a great extent; and there have been for many years a great number of persons interested, as part owners or licensees, in the question whether, independently of covenants or agreements, a right of contribution, in any form, or to any extent, exists between such parties or any of them. The amount of property and the number of persons to be affected by this question must be very great. The question has arisen, and been propounded to counsel, in many instances; but after having made extensive inquiries, we cannot learn that it has ever before been presented to a judicial tribunal in any form. The learned counsel in this case have acknowledged their inability to find any authority in point, and have argued the question principally by analogy. The prevailing sentiment among patent lawyers, we have reason to believe, is adverse to the right; and many of them are in the habit of advising clients to make provision on the subject, as well between part-owners as licensees, by special agreements. The analogies which have been suggested by counsel, and those which have suggested themselves to our own minds, are quite unsatisfactory; because a patent right, as it exists in this country, is a species of property so unlike every other species, and is made profitable in so great a variety of ways. The authorities cited for the plaintiffs are those which relate to tenancies in common of real estate. But real estate is made profitable, either by occupation, with or without cu tivation, or by renting it. And if either party is dissatisfied with holding it jointly or in common, he may have partition. But there is no provision for partition of patent rights; and they are so diverse in their nature that no general statement can be made as to the manner in which they are made profitable. Perhaps, in a majority of cases, the value of the right depends upon the peculiar circumstances and skill of the owner. At common law, no right of contribution existed between tenants in common of real estate. By statute 4 and 5 Anne, c. 16, if one tenant collects and receives more than his share of the rent and profits, he is made liable to contribution; and this statute has been adopted in Massachusetts, *Munroe vs. Luke*, 1 Met. 463. *Calhoun vs. Curtis*, 4 Met. 423. But the statute has not been held, either in England or here, to extend to patent rights. It may be added, that the law as to the respective rights of part owners of an interest in a patent right should be uniform throughout the United States, and cannot be affected by the law of any particular state in respect to real property.

There is some analogy between a patent right and a right of way. A patent right is a monopoly of a certain way of doing a thing. It is an exclusive right of way, in the region of invention, secured to one for a limited period as a compensation for having first discovered it. It was never held that if one of several owners of a right of way over a tract of land used the way more than the other part owners did, he thereby became liable to them for contribution. The doctrine of contribution has never been held to apply to the use of rights of this character. Yet it would be unsafe to draw any conclusions from this to a patent right, because the analogy is so faint.

There is some analogy between a patent right and a right to take tolls; for the royalty is in the nature of toll for the use of the patented way or method. Both are incorporeal rights; and a patent is sometimes made profitable by simply taking a royalty from those who use the invention under an assignment or a license. If one tenant in common of a right to take tolls were to receive more than his share, a right of contribution would probably exist on the part of his co-tenant; but it would not be safe to apply the rule to patent rights, because the taking of tolls is simply the receipt of money for the use of the common property, but the use of patent rights and the contracts for royalties usually include other elements. The present case illustrates this remark. Each part owner sells his machines for a price supposed to include a royalty. But he must first invest money in the purchase of machines. Then he must expend labor, skill, and money in finding purchasers. And at the last he must take the risk of losses. And each of these elements, and several others relating to the proceedings of the other party, mustenter into an equitable adjustment of a contribution.

A patent right is a chattel interest; therefore a tenancy in common or part ownership in it is much like tenancy in common or part ownership of other personal property. But the use of a patent right is different from the use of any other property; and therefore it is not safe to follow the rules adopted in regard to the mutual liabilities of part owners of ships, horses, grain, liquor, &c. It would not be safe to conclude that, because the owner in common of a horse is *not* liable though he retains the exclusive use of him, therefore the part owner of the patent who used it exclusively is *not* liable; nor because the tenant in common of the grain or liquor who uses it exclusively and consumes it in using *is* liable, therefore the part owner of the patent *is* liable. There is a possibility that the part owner of a patent may so supply the market as to appropriate to himself the whole value of the patent; and, on the other hand, his use of it may have the effect to create a market so extensive as greatly to enhance the value of the whole patent. On the whole, then, we are compelled to reject all arguments from analogy, and look at the question upon its own apparent merits.

There is nothing restrictive in the grant of the defendants to the plaintiffs and Perkins, dated March, 29, 1852. It assigns to them, their representatives and assigns, "the sole and exclusive right to use and vend to others to be used, (but not to build or make,)" the machines in question, within the territory specified. It is agreed that Perkins was the purchaser of one-half the right, though this is not indicated in the assignment; and that this proportion of it was re-purchased by the defendants from the administratix of Andrews, to whom Perkins had sold his share. But the language used seems to convey to one as full a right to use and sell the machines as another. It is not in any respect distributive. Terms might easily have been used which would indicate the extent to which each party might use the right, and his liability in case he used it beyond the limitation specified; but such terms are omitted.

There is nothing to restrict the party owning each moiety of the right from selling and assigning that moiety, or any fractional part of it, or as many fractional parts as he pleases. Each may purchase as many machines as he pleases; and having purchased them, he may sell them to others with the right to use and sell them; or he may refuse to sell them, and may rent them, or establish manufactories, either alone or in company with others, in which the machines shall be used. Or either party may neglect or refuse to purchase, use or sell any machine or any rights, or to make his moiety profitable in any way. The right is thus subject to transfers and subdivisions, and may be used in a great variety of ways. None of the parties interested has any right to control the action of the other parties, or to exercise any supervision over them. It is difficult to see how an equitable right of contribution can exist among any of them, unless it includes all the parties interested, and extends through the whole term of the patent right. And if there be a claim for contribution of profits, there should also be a correlative claim for losses, and an obligation upon each party to use due diligence in making his interest profitable. It is not and cannot be contended that these parties are copartners; but the idea of mutual contribution for profits and losses would require even more than copartnership. Nothing short of the relation of stockholders in a joint-stock company would meet the exigencies of parties whose interest may be thus transferred and subdivided.

But even as between the original parties, as there was no mutual obligation to contribute for losses, or to use any diligence to make the property profitable, and as each party was at liberty to buy, use and sell machines at his pleasure, and to sell his moiety of the right, or fractional parts of it, we think no obligation arose out of the part ownership, as being legally or equitably incident to it, to make contribution of profits. But in the absence of any contract, we think each party was at liberty to use his moiety as he might think fit, within the territory described. If the defendants have realized any profit in the manner alleged, it has been by investing capital in the purchase of machines, and the use of skill and labor in selling them; and they have taken the risk of losses. Apparently there is no more reason why the plaintiffs should claim a part of the advanced price for which they may have sold their machines than there would have been for claiming a part of the price if they had sold their right itself for an advance. It may possibly be that the sale of the seventeen machines so far supplies the market that the plaintiff's moiety of the right is greatly reduced in value; but if it be so, the consequence is very remote, and dependent upon a great variety of causes. There have been patented articles in respect to which such a sale would have greatly enhanced the value of the other moiety of the right, by its tendency to create a demand. Such a consequence would also be remote.

These parties must be regarded as having interests which are distinct and separate in their nature, though they are derived from the same contract; and having such interests, with the right to use them separately, they cannot for any legal use of them incur any obligation to each other. Plaintiffs non-suited.

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ISSUED FROM THE UNITED STATES PATENT-OFFICE

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

PATENT CLAIMS.—We believe it is the custom of the Patent Office to suspend the issue of patents for the holiday weeks, which accounts for the non-appearance in this number of the usual official list for the week ending December 29, 1863.

The officials are probably busy in looking over matters and in balancing the books pursuant to entering on a new year. We wish Commissioner Holloway and all the attaches of the Patent Office a "Happy New Year!" And we trust that with clean hands and clear consciences they will enter resolutely on the duties of the year, and, if possible, improve on the past. They have all done well, as the official records abundantly prove.

PATENTS

GRANTED

FOR SEVENTEEN YEARS!

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents:—

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly, CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant, J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant, WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the Rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

J. M., of Ill.—You must have made some error in calculating the head between the tank and well; there is no air in the pipes, or should not be under the circumstances. It is much more likely that your pipes are fouled with something; you had better go over the ground again. We know nothing of the special work on the subject you mention; examine the columns of the SCIENTIFIC AMERICAN.

C. C. B., of Pa.—Compressed air would not lighten the draft of a vessel or make her go faster. Carburetted hydrogen or the gas used for lighting our streets would exert a lifting force, but it would be imperceptible on so great a weight as a vessel.

V. C., of N. J.—We think Henry C. Baird, of Philadelphia, can furnish you with a work on beer making. You had better write to him for one of his catalogues.

A. M. H., of Mass.—The idea of conveying the products of combustion through the water is quite old, and owing to practical difficulties it has not been successful. Your plan of boiler seems to be new and well suited to the purpose, but in order to determine its value an experiment would be necessary.

C. B., of Ohio.—You will find the sheep-shearing machine of R. P. Bradley, Cuyahoga Falls, Ohio, illustrated and described on page 360, Vol. XII. (old series) of the SCIENTIFIC AMERICAN. Several patents have been granted for sheep-shearing machines, but as yet we have not heard of their successful introduction. Such a machine is a great necessity. A millstone weighing about 1,000 pounds will weigh about as much running at the rate of 100 revolutions per minute, as when at rest. A high rotary motion imparted to a stone has a tendency to raise it from its spindle, but we have no records of experiments instituted for the purpose of determining the pressure upon the spindle of stones running at different velocities.

J. W., of N. Y.—A centrifugal battery for discharging bullets is old, and you cannot obtain a patent for such an engine of war as a new invention. You can patent any improvement you may have made. You will find a battery of this character illustrated on page 361, Vol. XII. (old series) of the SCIENTIFIC AMERICAN.

W. & R., of Pa.—Galvanized iron which exhibits a crystalline surface receives a thin coat of tin before it is immersed in the molten zinc. Instead of immersing the clean iron in the chloride of zinc before placing it in the molten metal, as you have done, immerse it in the chloride of tin, and see what a different effect will be produced.

M. F. S., of Va.—Indian ink marks can be removed from the flesh by blistering with cantharides or the oil of mustard, but we cannot recommend you to try the experiment.

J. B., of Mass.—Nitric acid dissolves lead and holds it in solution. If you can retain molten lead in a liquid state, cold, you have made a valuable discovery.

M. L. W., of N. Y.—An "oval" is very easily made with a string and two stout pins. Tie the ends of a cord together, slip it over the pins loosely and then place a sheet of paper under them: it is supposed that the pins have been driven into a table or board previously. Take a pencil and place it inside of the string, stretch the same out to one side and draw the pencil on the paper. In this way you will make an oval in spite of yourself.

P. H. R., of C. W.—Very many boilers are arranged to burn spent tan and bark and saw-dust; a strong blast is requisite

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C. L. P., of Mass.—If you have had a machine in public use for five years, a patent obtained for it now could not debar you the right to continue the use of the machine; furthermore, the patentcould not be sustained. If your machine has been privately used the patent would be valid.

H. H., of Mass.—The description of your invention is so imperfect that we cannot understand how it operates. Inventors who write to us for opinions should always describe their improvements as clearly and briefly as possible, and a sketch should always be sent, which aids us materially.

C. E. M., of N. Y.—Burnt tallow or grease cannot be restored to its original condition. When subjected to high temperatures animal and vegetable fats and oils are completely changed in their characteristics. At a red heat they are converted into inflammable gases.

W. S. P., of Mass.—Plaster-of-Paris casts cannot be rendered soft by water or oils. It dissolves in nitric and hydrochloric acids, and is decomposed by the carbonates of alkalies, such as carbonate of soda and potash.

L. M. D., of N. Y.—We do not know what you mean by "the carbon for casing steam pipes, nor the carbon used in the construction of electro-magnetic machines." In no case is carbon necessary for these purposes. Carbon is employed as the negative element in some electric batteries and for the terminals of the electric light. Graphine formed in the retorts of gas works is used in these instances. Ground coal is applied in dusting the molds for iron castings, and charcoal dust for filling around steam pipes in wooden boxes, as a non-conductor.

B. S., of Maine.—You cannot depend upon a syphon of bored logs to operate satisfactorily in draining a lake. As the fall is 40 feet, the best way to drain it is to cut a water-way through the embankment.

J. R., of Ohio.—The name of the inventor of the mariners' compass is unknown. It was employed in China long before it was used by European mariners.

M. H., of Pa.—The worms in your well may be destroyed by throwing some quick-lime into the water and allowing it to stand for several hours. After this draw off the water and allow a fresh supply to accumulate in the well.

A. B. & N. H. S., of C. E.—Benzine is simply employed as a substitutute for turpentine, in making a black varnish with asphalt; but great care must be exercised in using benzine, because it is so volatile,

H. S. & H., of Minn.—The prevalent opinion among millwrights in this section is that the best way to convey power from an overshot wheel is from cog gearing on the rims. The secondary shaft to convey the power has two pinions upon it, gearing with the cogs on the rims. On the other hand there are some millwrights who prefer to gear from a large pinion on the main shaft of the wheel, but where the power can be taken from the circumference of the wheel, this mode is more generally preferred. It would afford us useful information if some millwrights would give us their experience with both modes of gearing.

J. P., of N. J.—We have read your long communication on the subject of balloons, musquito nets, and also your disquisition on the Book of Revelations. We fail to discover anything in your discussion of these subjects that merits our attention. If you have full faith in the balloon project, build one and sail down to Washington; call on Abraham and get him to join with you in a trip "on to Richmond." Musquito nets are out of season. Postpone your trial till next dog days, and as to your key to the Revelations, issue it in a pamphlet and send a copy to all the divines in the land. We prefer not to open our columns to a discussion of its merits.

J. I., of Pa.—The Commissioner of Patents report for 1862 is not yet published.

W. C., of Mass.—Your mode of separating vegetable fiber for the manufacture of paper stock is substantially the same as the patent of A. S. Lyman, of this city.

H. J. B., of N. Y.—Address H. C. Baird, Philadelphia, Pa., for a work on marine engines.

I. B., of Ill.—Powerful lifting jacks are manufactured by Richard Dudgeon, No. 24 Columbia street, this city.

B. & Co., of Pa.—You can obtain the best quality of chilled iron rolls, from the Birmingham Iron Foundery, Birmingham, Conn.

J. McL., of N. Y.—You had better call at our office and explain fully what you want, and we can then arrange to make a preliminary examination on our usual terms. We are not in the habit of making such examinations and reports through the columns of our paper.

C. C., of N. Y.—Probably the best method of working the patent on joint account would be to form an association or company under the general law in New York State. All the holders could assign to the company. Where a patent is owned by several persons, each individual may work under the patent without accountability to the other owners.

Ship's Spikes.—M. B. Sutton & Co., of Philadelphia, wish to obtain a machine capable of making a good-shaped ship spike.

J. M., of Pa.—If you have assigned your rights to the extended term of the patent, in case of its extension you will derive no benefit from it. The Commissioner of Patents would not grant the extension if this state of facts should be made to appear. A patent cannot be extended unless the original inventor is to derive pecuniary benefit from it.

A. H.. of Conn.—We do not understand your question clearly. You say you have a lathe and wish to alter the cone pulley on the counter shaft, and supposing the diameters to be 12, 9, 6 3 inches (the cone on the lathe being the same) if the counter shaft pulley is made 15 inches, what must the cone pulley on the lathe be? Youalso say that "youare aware if I make the same difference between the diameter of the counter shaft pulleys that I do on the lathe spindle, the former would take up or let out more belt than the latter." We do not see this at all. The only rule for cone pulleys is that of simple proportion. If you wish to increase the 12-inch size on the over-head shaft to 15 inches, you must add to all the others in the same ratio; you cannot add to one and have the belt run on all the others.

B., of Conn.—A complete photographic apparatus, including best style of lenses, camera boxes, head rests, printing frames and a moderate supply of chemicals, glass, paper, &c., costs about $100.

W. S. H., of Ind.—We are much obliged for the sketch and description of the filter for removing lime sediment from water previous to its introduction into boilers. The idea is a good one but it embraces nothing novel.

S. K., of Ill.—The *Practical Mechanics' Journal* is published in Glasgow, we believe. It is a very longtime since we have seen a copy and it may have stopped. Messrs. Willmer & Rogers, No. 47 Nassau street, this city, are agents for supplying foreign publications.

E. W. S., of Vt.—Unless you can procure the Patent Office Reports through your member of Congress we know not how else you can get them. The Commissioner has but few copies at his disposal.

J. B., of Pa.—Files are not manufactured bent to order, but could be if desired; you can bend your own files by heating them to a dull red and striking them with a wooden mallet on a block of wood. Re-heat the file as high as you can without burning it and plunge into cold water.

D. W. R., of Pa.—We are not aware that any patent fuel is made in this country; it is much used on English steamers in China and India; its cubical form rendering it easily packed; it might be a good idea to introduce it in this country.

A. H. M., of Conn.—A long shaft requires more power to drive it than a short shaft, independent of the friction of the journal boxes, because it is much heavier than the short one. A long shaft driven by power applied at one end is more liable to spring and act as a lever against the main driver than when the power is applied near the middle. We have, however, seen a shaft carried from a water wheel a distance of 440 yards into a cotton factory.

J. S. P., of Coun.—You will find in No. X. last volume of the SCIENTIFIC AMERICAN an engraving of a nail machine that combines the advantages you suggest.

C. C., of Ky.—You will find an engraving of a machine for manufacturingice on page 72, Vol V. of the SCIENTIFIC AMERICAN. It is an English invention, and has not, as we are aware, been introduced into this country.

NOTE.—Correspondents who write to us for information will not receive attention unless they sign their names to their letters. We always want to know with whom we are doing business.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Dec. 30, 1863, to Wednesday, Jan. 6, 1864 :—

W. C. M , of N. Y., $25; C. S., of N. Y., $20; J. O. S., of N. Y., $16; B. & L., of N. Y., $16; O. L., of N. Y., $20; J. H., of Ill., $26; H. H. of Pa., $48; J. E. T., of Mass., $20; N. B., of Ill., $15; S. H. M., of Ill., $25; G. W. A., of Va., $16; M. L., of Pa., $16; J. F. & E. P. M., of Mass., $51; J. D. H., of Pa., $25; L. L., of Ohio, $16; L. & L. of Mass., $25; C. D., of Minn., $16; E. W., of N. Y., $10; J. L. J., of Conn., $16; A. K. F., of Texas, $20; A. P., of Chill, $15; H. H. E., of Conn , $44; J. H., of N. Y., $23; I. N., of N. Y., $25; J. O. H., of Pa., $40; S. S. M., of Mass., $25; M. & H., of N. Y., $20; I. & J. G., of Conn., $41; H. B., of England, $20; M. P., of Pa., $20; W. W., of Cal., $15; E. G. R , of Mich., $25; S. & G., of Mich., $16; J. T., of Wis., $16; F. B. P., of Mo., $25; G. A. S., of Conn., $25; W. G., of Ohio, $16; J. J. McC., of Conn., $16; J. R. G., of Ill., $15; J. C. C., of Ohio, $40; J. P. C., of Ill., $25; O. C. McC., of Ohio, $16; G. C., of Conn., $25; A. F. C., of Conn. $28; H. D. F., of N. J., $18; D. C. W., of N. Y., $41; D. P. S., of N. Y.,, $20; S. L. H., of N. Y., $10; J, L., of N. Y., $16; R. W., of Mich., $20; E. H., of Mich., $10; J. J. R., of Ill., $15; D. W. H., of Cal., $15; M B. W., of Conn., $16; H. R., of Wis., $16; W. M., of Ohio, $20; O. W. K., of Wis., $16; W. G., of Ind., $25; C. M. M., of N. J., $16; H. D., of Ohio, $25; W. E. C., of Ill., $25; S. L., of Ohio, $25; P. C., of Mass., $16; E. W., of Mich., $20.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Dec. 30, 1863, to Wednesday Jan. 6, 1864 :—W. C. M., of N. Y.; C. S., of N. Y.; J. O. H., of Pa., S. S. M., of Mass.; H. D., of Ohio; J. D. H., of Pa.; L. & L., of Mass.; S. L , of Ohio; H. H. E., of Conn.; J. H., of N. Y.; I. N., of N. Y.; I. & J. S. G., of Conn.; E. G. R., of Mich; G. A. S., of Conn.; J. E., of N. Y.; J. P. C., of Ill.; A. F. C., of Conn.; H. D. F., of N. J.; D. C. W., of N. Y.; J. H., of Ill.; W. E. C., of Ill.; W. G., of Ind.; M. & T., of England; G. C., of Conn

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Addres MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given ; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding nsed on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.

Back Numbers and Volumes of the "Scientific American."

VOLUMES I., II., III., IV., V., VII. AND VIII. (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. VOL. VI. is out of print and cannot be supplied.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

IMMIGRATION.

AMERICA VINDICATED TO THE WORKING MEN OF ENGLAND.—I beg to inform Machinists, Iron Founders and all interested in any way in the manufacture of Iron and Steel, that I shipped on Saturday, the 2nd inst., per the *Edinburg*, to Liverpool, *sixteen thousand* copies of the HARDWARE REPORTER for *European Circulation;* the same to be distributed gratuitously among the working men of Great Britain. I also sent by the same ship a SPECIAL AGENT charged with the duty of seeing that this distribution is effectively made. I am now receiving orders for a second installment, to be shipped within ten days. This movement has the support of the largest manufacturers in the country, and is sustained by the leading advocates of American manufacturing interests at the Press. Terms $8 per hundred delivered here; $10 per hundred mailed, postpaid, to any address in Great Britain or America $12 50 per hundred delivered by hand to workingmen in Great Britain. JOHN WILLIAMS, Editor of the *Hardware Reporter*, 80 Beekman street, New York. 1*

UPHAM'S PATENT STEAM TRAP.—THE BEST AND cheapest article yet offered to the public, for effecting a saving of fuel by preventing a waste of steam where it is used for warming. Address HENRY A. CHAPIN, Agent for the manufacturer, Bridgeport, Conn., or N. UPHAM, Norwich, Conn. 3 4*

CONES FOR UNITED STATES MUSKETS, ENFIELD and Austrian Rifles, and for the Shells of Rifled Cannon, promptly supplied in any quantities and warranted to pass Government inspection. Also second quality cones of above models, and cones for sporting guns and pistols. Address COLE, BROTHER & TILDEN, General Machinists, Pawtucket, R. I.

N. B.—Also manufacture every description of improved Reed Machinery. 3 10*

WANTED AN ENGINEER TO SEND TO A FOREIGN country. A young unmarried man is required who is a good mechanic and possessed of good general business ability. Call and see or address S. BALDWIN, corner of Jay and Plymouth street, Brooklyn, N. Y. 3 4

STEAM AND WATER GAGES, GLASS TUBES, PATENT Gage Cocks, Whistles, and Engine Counters for sale, also Indicators for ascertaining the Working H. P. of Steam Engines, Heat Gages and Signal Gongs for steamboats. E. BROWN, 311 Walnut street, Philadelphia, Pa. 1*

FOR SALE—TWO UNPATENTED INVENTIONS OF modes of propelling street cars by steam power upon steep grades. Address C. W. CRAWFORD, Fort Pitt Works, Pittsburgh, Pa. 1*

THE GAITERETTE—LUDLOW'S PATENT ON THE above improvement (dated Nov. 10, 1863), for sale on reasonable terms. Address G. W. LUDLOW, Elizabeth, N. J. 1*

THREE NEW AND VALUABLE INVENTIONS MAY be obtained cheap, by addressing MARK A. RICE, Hillsdale, Mich. 1*

VALUABLE NEW INVENTION.—THE SUBSCRIBER having obtained Letters Patent for a valuable instrument for lighting streets, which obviates the use of the ladder; also for lighting halls, stores, and all kinds of manufacturing establishments, especially where there is objection to the using of an open light, it is invaluable. As the demand is such that I am not able to supply all, consequently I would like to make sale of the whole or part of New England and some other States. Any common mechanic can manufacture them. Terms easy. For further information address H. ELLIS, P. Post-office Box 155, Charlestown, Mass. Full particulars will be given by mail or otherwise. 3 2*

MORE AGENTS WANTED.—AGENTS ALL AGREE that they can make more money by selling Taylor's Patents, than they can in any other legitimate business. They have found it to be a fact, they can sell in nearly every house. Agents are restricted in their territory, therefore no collison. Reader, if you wish to be an agent for your county, address with stamp for particulars A. E. TAYLOR, New Britain, Conn. 1*

PFLEGHAR & SCHOLLHORN, PRACTICAL TOOL-MAKERS and Builders of small machinery and models. Room No. 6 Stafford Building, opposite the *Courier* office, New Haven, Conn. 3 3*

PARTNER WANTED.—A PRACTICAL MACHINIST or Founderyman in a shop in a country village now doing a good business. One who can furnish some capital preferred. For particulars address S, care of C. O. READ, 39 Green street, New York, who will answer verbal inquiries. 3 3*

PATENTEES EVERYWHERE!—OFFICE FOR SALE of Patent Rights, L. C. Hootee & Co., 229 Broadway, New York. All rights sold speedily. Agents wanted. Valuable Rights for sale. References, Peter G. Washington, and Eli Thayer, New York; Horatio King, Washington. 1*

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A VALUABLE WORK FOR INVENTORS PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents :—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax —Extensions—Interferences—Infringements—Appeals—Re-issues of Defective Patents—Validity of Patents—Abandonment of Inventions —Best Mode of Introducing them——Importance of the Specification —Who are entitled to Patents—What will prevent the granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees ; also a variety of miscellaneous items on patent law questions.

It has been the design of the publishers to not only furnish, in convenient form for preservation, a synopsis of the PATENT LAW and PRACTICE, but to answer a great variety of questions which have been put to them from time to time during their practice of upwards of *seventeen years*, which replies are not accessible in any other form. The publishers will promptly forward the pamphlet by mail, on receipt of six cents in postage stamps.

Address MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, No. 37 Park Row, New York.

$200. $150, $100, $50 PREMIUMS.—TO EDITORS, Ladies and Others. I will pay the above-named amounts for the best four articles on either my Soap, Saleratus, or Concentrated Potash. The article must state the writer's experience in using the goods, and must be not less than ten lines, and be published in the editorial columns of any good family newspaper. Any party wishing to compete for the above, and desiring further information, may address the undersigned. Each person writing and publishing a notice, as above, will mail a marked copy of the paper containing the notice to me, and also write me by mail, giving full address. The Premiums will be awarded on the fourth day of July, 1864.
B. T. BABBITT, 64 to 74 Washington street, New York. 12 tf

B. T. BABBITT SOAP, SALERATUS, POTASH, YEAST POWDERS.

y the description of Babbitt's soap kettle in

he SCIENTIFIC AMERICAN one would suppose that when

abbitt put one foot on the North Pole,

nd the other on the south, so bold,

y the continental he could soap the journals of the universe.

atch after batch, in this mammoth kettle is immersed;
t stands four stories high and is a tremendous saponifier.
he tallow per batch costs $30,000, purchased by different buyers.
he large quantity it holds is 300,000 pounds—largest in the world.

atisfied are all the customers that 'tis truth, and bold.
ld-fashioned folks buy it because 'tis splendid.
ll good families buy it because it's recommended.
ositively is the quality unsurpassed.

aleratus is always ranked first-class;
ll the bread made from it is composed of flour, salt and water:
arge quantities of this article are manufactured by workers;
ach day produces fifteen tuns of saleratus.
arely do we see such quantities displayed among us;
nd all in one pound papers is weighed.
he beautiful girls, with tiny fingers, are displayed;
nion saeratus is nicely put up by the maids,
aleratus is packed in red and looks very neat;

otash in tin cans by all is said to be complete,
ver all the territory Babbitt cares not who he competes.
ell the people what beautiful soft soap it makes,
nd certainly you will not hesitate a quantity to take.
atisfied are all who buy this potash for soap to make,
ave come to the conclusion that they can make no mistake.

east powder is put up in one-pound-tin-checquered cans;
very house-keeper knows it is good, so does every man,
ll those who use it do declare;
uch biscuit and bread they never see any where.
he best of families call for this kind of goods.

ersonally know they are very good
n hand Babbitt always keeps a good stock.
hen merchants call they are supplied by the box;
octors surely say they make the best of bread;
very family with the biscuit have their table spread.
arely do the people know of what Babbitt's yeast is composed,
alt is truly the base, so out the secret goes.

T. B.

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UNITED STATES MILITARY RAILROAD OFFICE, No. 250 G street, Washington, D. C., December 19, 1863.

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I will sell at public auction, at the Orange and Alexandria Railroad Depot, in Alexandria, Va., on WEDNESDAY, the 13th day of January next:

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DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., Dec. 15, 1863.

To the Growers and Manufacturers of Flax and Hemp :

THE COMMISSIONERS APPOINTED BY THIS DEpartment, consisting of Hon. J. K. Morehead, of Pennsylvania, William M. Bailey, of Rhode Island, and John A Warder, of Ohio, to consider the following appropriation made by the last Congress, viz.:

"For investigations to test the practicability of cultivating and preparing flax and hemp as a substitute for cotton, twenty thousand dollars."

Having met, and after several days' investigation, believing that a further and fuller notice of their investigations might produce valuable results, adjourned to meet again on Wednesday the 24th day of February next, at 12 o'clock, M.

They request all interested in the distribution of this appropriation, or anxious to develop the subject for the public good, to send to this Department, on or before that day, samples of the hemp and flax in the different stages of preparation; of the fibers and fabrics prepared by them, accompanied by statements of the various processes used, and the cost of production in each case; also, descriptions of the kind and cost of machinery used, where made, &c., together with any and all information that may be useful to the Commission.

This information is necessary before an intelligent distribution of the appropriation can be made. ISAAC NEWTON.
1 9 Commissioner.

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PATENT CALIPERS.—THE SELF-ADJUSTING CALipers illustrated in the "Scientific American" of Aug. 8, 1863 (see engraving in that number) are manufactured by the patentees at Worcester, Mass., and are now ready for delivery. Samples sent (post-paid) by mail, on receipt of 75 cents in currency; usual discount made to the trade. Agents liberally dealt with. Address KIMBALL & TALBOT, Worcester, Mass. 1 4*

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No charge is made for the publication, and the cuts are furnished to the party for whom they are executed as soon as they have been used. We wish it understood, however, that no second-hand or poor engravings, such as patentees often get executed by inexperienced artists for printing circulars and handbills from, can be admitted into these pages. We also reserve the right to accept or reject such subjects as are presented for publication. And it is not our desire to receive orders for engraving and publishing any but good Inventions or Machines, and such as do not meet our approbation in this respect, we shall decline to publish.

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GUILD & GARRISON'S CELEBRATED STEAM Pumps—Adapted to every variety of pumping. The principal styles are the Direct Action Excelsior Steam Pump, the improved Balance Wheel Pump, Duplex Vacuum and Steam Pumps, and the Water Propeller, an entirely new invention for pumping large quantities at a light lift. For sale at Nos. 55 and 57 First street, Williamsburgh, and No. 74 Beekman street, New York.
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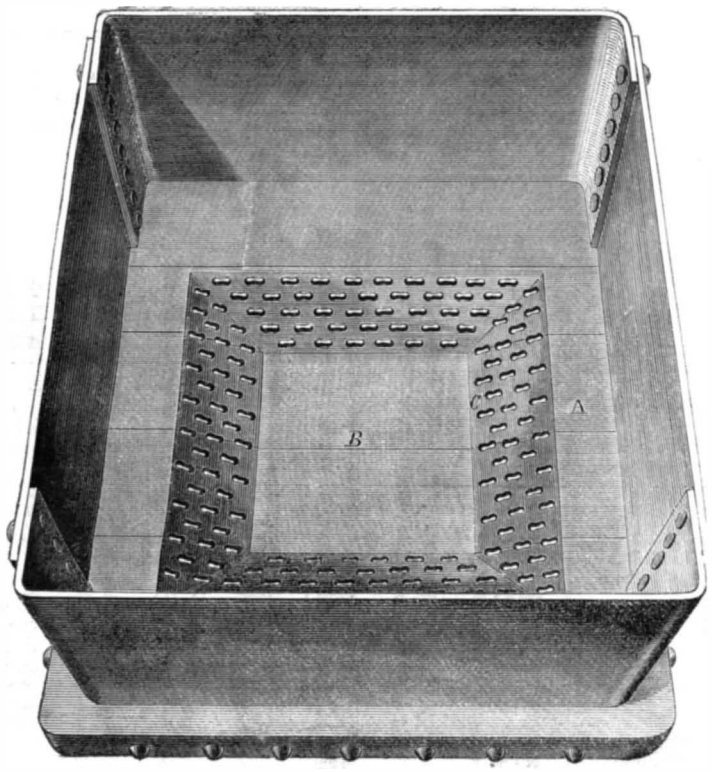
Improved Grate for Locomotive Fire-boxes.

The object of the fire-box herewith illustrated is to obtain a safe, durable and economical arrangement for the furnace of a locomotive boiler. In its present form it is designed exclusively for wood burners. It is well known to all engineers and railroad men that bridges, ties and other important parts of railways are frequently destroyed by the burning brands and coals scattered from the engine in its transit. This evil is effectually prevented in this fire-box, as will be seen by referring to the engraving and following description.

The outer sheet of the fire-box constituting the water space between the two sheets, inner and outer, is omitted in the engraving, as not essential to an illustration of the principle involved. This hopper-



LISTER'S GRATE FOR LOCOMOTIVE FIRE-BOXES

shaped fire-box, as the inventor terms it, rests upon the ordinary frame placed within the fire-boxes of locomotives for the grate bars to rest on, and is composed of cast-iron plates, A, having a closed or "blind" bottom, B; these plates are of a suitable strength and are furnished with perforations all around the inclined portions; these are of the same area as the tubes in the boiler, and admit air to maintain an active combustion of the fuel.

It is claimed that these bars, arranged in the form of a hopper are much more economical in weight of castings than ordinary grate bars, also that it is safer, inasmuch as no coals can fall out upon the track or bridge: that it is more durable and not so liable to burn out, and that it can be readily applied to any locomotive, without any alteration other than the removal of the old grate bars and the substitution of these in their stead. This is a very excellent device for wood burners, and we think it will prove all that the inventor claims for it.

A patent on this invention is ordered to issue through the Scientific American Patent Agency to D. Lister, Locomotive Superintendent of the Northern Railway, Toronto, C. W. Any further information can be obtained by addressing him as above.

California Sherry and Madeira.

Although the business of wine-making in California is yet in its infancy, the progress which has already been made by vineyard proprietors toward producing a merchantable article of wine capable of competing with the European article in the world's market, is most gratifying. In addition to the ordinary white and red wines, Angelica and Port, the Buena Vista Vinicultural Society at Sonoma is now manufacturing Champagne in large quantities and of fine quality, while the wine-growers of Los Angeles are turning their attention, with success, to the production of Sherry and Madeira wines, equal in flavor and superior in purity to the imported wines bearing their names. The process by which these last-named wines are produced is extremely simple and not expensive. The proprietor of the Rising Sun and Los Angeles vineyards has perfected his apparatus for the manufacture of Sherry and Madeira on a large scale, and a description of his establishment, now in full operation, will be interesting to the general reader. A large apartment, in a brick building, is walled and plastered so as to be air-tight, and heated to a mean temperature of 100° Fah. by means of flues connected with furnaces below. Into this chamber the casks containing the common white wine intended for conversion into Sherry and Madeira are rolled, and the doors are closed so as to admit the influx of no cold or damp air for a period of seventy-five to one hundred days, the heat is kept up continuously and the wine is pumped from cask to cask as often as possible during the whole period, and the wine under this process gives off an immense volume of gas, which is highly inflammable and is extremely dangerous to the workmen, and not only loses in bulk to a considerable extent, but changes totally in character—body, color, flavor, and bouquet, all becoming of a different kind; the Sherry ripens under this treatment first, the Madeira requiring from ninety to one hundred days to fully ripen ready for market; the change is complete when the casks come out of the chamber, but age gives tone and mellowness to the wine, which will continue to improve for years.

Cobbling up Steam Boilers.

Respecting the practice of "mending" steam boilers, as a cobbler would an old shoe, the London *Mechanics Magazine* says:—"None except those persons who have resided for a lengthened period in our mining and manufacturing districts, can conceive of the reckless disregard of human life displayed in the employment of steam power. Boilers are patched in the rudest manner while they hold together. We have seen a plain cylindrical boiler of 4 feet in diameter and some 30 feet long, carrying 60 pounds steam, with three patches over the furnace side walls, each consisting of a plate more than a square foot in area, covering a rent the result of corrosion. These patches were not riveted on. Each was fixed in its place by a single $\frac{3}{4}$-inch bolt, tapped into a flat bar $2\frac{1}{2}$ inch by $\frac{1}{2}$ inch and a couple of feet long, placed outside the shell, the plate being placed inside and held up in its place by the pressure of the steam, the joint being made tight by red lead and a bit of canvas. This kind of patch is common all through Staffordshire, and is used because the plates will not bear riveting from wear. We have seen the boiler-maker, ere now, send his hammer through the so-called sound plate, by accidentally striking it, instead of the rivet, which he wished to close. We might accumulate a volume of such instances were it necessary. Those who employ steam power should recollect that the duration of a boiler is far from being a mere question of time. It depends on so many circumstances, that it is impossible to say what may be its condition without frequent and careful inspection by those who can form a proper opinion; and we may conclude this article by pointing out that every man who makes use of steam power is guilty of criminal negligence, if he disregards the means of safety which inspection alone can place ready to his hand."

Immense Dock.—At Birkenhead, opposite Liverpool, England, there is a great float, or dock, which has a water area of 121 acres, and is approached by three great entrances. The principal entrance has gates with a clear opening 100 feet in width. It is not quite finished yet, and the cost thus far has been enormous, being no less than £4,000,000, half of which was wasted in mistakes committed in the early stages of its construction.

THE

Scientific American,

FOR 1864!

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The publishers of the SCIENTIFIC AMERICAN respectfully give notice that the Tenth Volume (New Series) commenced on the first of January. This journal was established in 1845, and is undoubtedly the most widely circulated and influential publication of the kind in the world. In commencing the new volume the publishers desire to call special attention to its claims as

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of all the latest and best inventions of the day. This feature of the journal is worthy of special note. Every number contains from five to ten original engravings of mechanical inventions relating to every department of the arts. These engravings are executed by artists specially employed on the paper, and are universally acknowledged to be superior to anything of the kind produced in this country.

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